

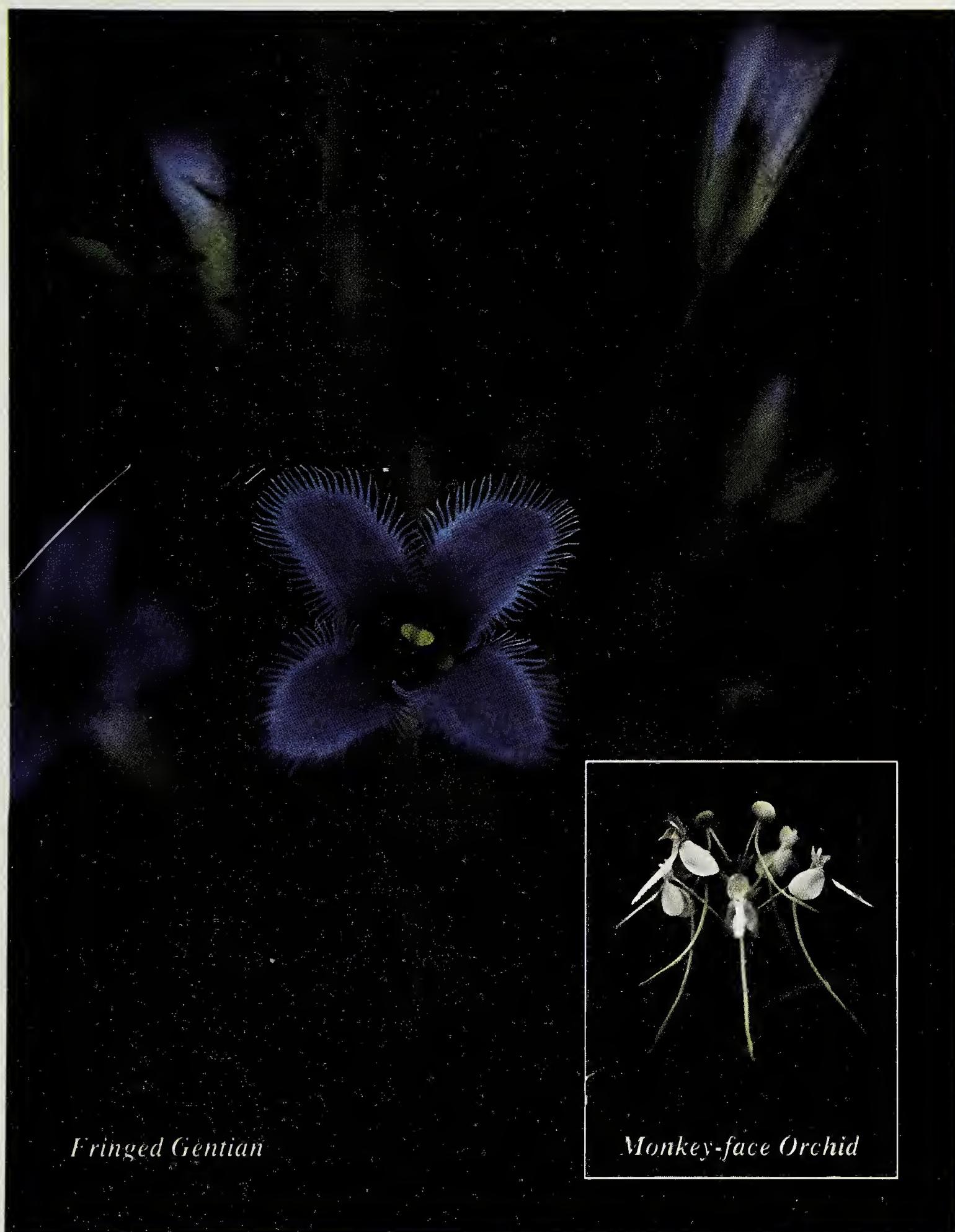
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Fipularia

A BOTANICAL MAGAZINE

Published by the Georgia Botanical Society

1994



Fringed Gentian

Monkey-face Orchid

IN THIS
ISSUE

Wildflower Art Commissioned by Deen Day Smith
Rare Monkey-face Orchids in Georgia

From the Editor: Care and Feeding of *Tipularia*

Germination

The idea of *Tipularia* originated with Marie Mellinger and David Emory. Out of David's interest in botanical journals and Marie's knowledge of native plants, they felt it was time to publish a magazine.

They spoke to Margaret Shannon, well known journalist and Bot Soccer. Margaret made notes, sketched a plan and presented it to the executive committee at the society's 1986 business meeting at Tallulah Falls. Convinced it would not bankrupt the society, the idea was accepted.

Margaret selected the original board of editors. She wanted degreed botanists, among whom were college professors, Harriett Whipple and Wayne Faircloth, and Treadwell Crown. Along with David, Marie, and Margaret as executive editor, a professional board would bring credibility and respect to the magazine. They began meeting at Margaret's house. There would be two issues a year, with the idea of having four a year—Margaret's dream.

Margaret gathered ideas from everywhere: *Nature*, *Smithsonian*, other botany journals. Her biggest surprise was the professional botanists who contributed to the magazine free and then thanked her.

David suggested *Baptisia* as the name, but that had a religious connotation. Marie came up with *Tipularia*. It has a nice ring to it, is rememberable and is an orchid found, according to Marie, in every county in Georgia. The illustration of *Tipularia* on the cover of the first issue in November

1986 is a 1903 drawing by Blanche Ames whose husband, Oakes Ames, was a renowned orchid expert.

Nurturing

Margaret Shannon was "retired" and trying to work on a book. After producing three issues of *Tipularia*, she found it taking up all of her time, so turned the editorship over to **Anna Belle Close**, *Tipularia* staffer and retired professional proofreader with graphic artist, husband Bill, who would do the layout and design.

Anna Belle admired Margaret's format for *Tipularia* and followed her example. Anna Belle claims, "One of my creative contributions was to superimpose *The Ballad of Billy Bartram* over the silhouette of a fiddler, which my husband Bill drew for the Spring 1989 issue."

Tenaciously, Anna Belle produced four issues. She considered it a sad day, when she had to resign due to a 13-month bout with recurring walking pneumonia.

Margaret took over *Tipularia* again as interim editor in Fall 1990 until Helen Stacey found a successor in **Ginger Kaderabek**, a professional editor and writer. Ginger brought us into the computer age by doing most of the pre-press production work on a Macintosh, as well as being editor.

Computerizing

In previous days of layout and pre-press, numerous jobs were done by different people. With the age of desktop publishing

Continued inside back cover

Membership

The Georgia Botanical Society is open to all persons interested in the botany of Georgia. Annual dues: individual or family, \$15; group, \$20; student, \$5. Send address and check payable to Georgia Botanical Society to Daisy Arrington (see opposite page). Members receive *Tipularia* without extra charge. Persons wishing only to receive the magazine may become *Tipularia* associates for \$10 a year. Single copies, when available, may be ordered from Sally Emory, 7575 Rico Rd., Palmetto, GA 30268; (1991 and before, \$4; 1992 and after, \$10).

Editorial information

Tipularia strives to combine the scientific authority of a botanical journal with the readability of a magazine. Some articles are assigned; unsolicited manuscripts are welcomed for consideration. *Tipularia* is unable to pay for articles or art, but there is no charge for publication of them.

Tipularia

Vol. 9, 1994

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On the cover: *Gentianopsis crinita* and *Platanthera integrilabia* from the Deen Day Smith Collection of Sculptures by Trailer McQuilkin, photographed by Suzanne Schneidau

Inside front: From the Editor

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Following the Fungi

By Bruce Horn

Photograph: Bruce Horn



The earthstar Gastrum saccatum, a type of puffball, thrives in leaf litter.

I magine my excitement upon leaving the windswept, snowy fields of Kansas in January and, three days later, encountering the wet, balmy forests of southern Georgia, where I was to start my new job. My first order of business was not to find a place to live but, rather, to check out the local park for mushrooms. In a brief walk through the woods, I recognized nearly forty genera of mushrooms among the oaks and pines. Since that time I have found many interesting species of mushrooms in the Coastal Plain of Georgia, a region that has been little explored mycologically.

Microscopic World

Fungi are ubiquitous, but since most are microscopic in their vegetative state, their presence goes mostly unnoticed and their vital activities often remain unheralded. Those fungi that are visible to the unaided eye comprise a diverse group loosely referred to as "mushrooms." Even mushrooms live largely unseen. Their feeding stage, or spawn, is made up of masses of microscopic filaments called hyphae. The hyphae grow concealed in soil, wood, leaf litter and other assorted organic matter, where they release digestive enzymes into their surroundings and absorb the resulting nutrients. Specific conditions of moisture, temperature and light stimulate the hyphae to grow and aggregate into a fruiting body known by most people as a mushroom. The spawn may produce fruiting bodies several times a year, once a year at a particular season, every couple of years or perhaps even once in twenty years. The unpredictable nature of these

fungi is what makes mushrooming such an exciting sport. It is possible to return to the same woods again and again and always find something new.

The sole purpose of the fruiting body is to produce spores and release them into the environment. In the case of gilled mushrooms, special cells called basidia line the gills under the cap and produce the spores, which sift down between the gills and are caught up by the wind currents. Those spores lucky enough to land on a suitable source of food germinate and grow into new hyphae.

Seasonality

Although the Coastal Plain of Georgia does not have pronounced seasons, there still is a definite seasonality to the kinds of mushrooms that appear. Mushrooms that fruit in the summer are not the same as those seen during the winter, and there is little overlap in species composition between the two seasons. Because of the comfortable temperatures, more reliable rains and, most importantly, the lack of ticks, chiggers and mosquitoes, I confess a preference for collecting mushrooms during the winter months. However, when the mushrooms are fruiting, such hazards are of little concern. Spring and fall, the transitional periods between the two major fruiting seasons, are often strangely depauperate of mushrooms, even under favorable weather conditions. Largely missing are the widely sought morels (genus

Morchella) and the potentially poisonous false morels (*Gyromitra*), mushrooms generally associated with spring farther north.

The genus *Amanita* is a favorite of mine, and summer brings out a remarkable array of species. Three species of the deadly poisonous destroying angel, *A. virosa*, *A. verna* and *A. bisporigera*, are present and sometimes abundant in the Coastal Plain. They are easily identified as a group by their stark white cap and gills, flaring ring on the stalk, and prominent cup buried in soil at the base (separation to species requires a microscope). The spectacular Caesar's amanita, *A. caesarea*, has much the same structure, but its cap is a brilliant orange, making it one of the most photogenic of all mushrooms. It is also one of the few esteemed edibles in an otherwise extremely dangerous genus. I am not



Bright orange Caesar's amanita is one of Georgia's most spectacular mushrooms.

Photograph: Bruce Horn

an ardent mycophagist (eater of fungi), but when I first found this species I felt compelled to try it. Mushrooms are obviously a matter of individual taste, and the Caesar's

amanita with its strong fishiness reminded me of a particularly unsavory abalone dish I once endured at a Chinese restaurant. Other common summer *Amanita* species include the blusher (*A. rubescens*) and the grisette (*A. vaginata*), as well as *A. fulva*, *A. spreta*, *A. flavoconia* and *A. roanokensis*.

In contrast to the plethora of summer *Amanita* species, the winter mycoflora of *Amanita* is far more manageable and is mostly confined to several species including *A. citrina* var. *lavendula* and the fly agaric, *A. muscaria* var. *flavivolvata*. *A. citrina* var. *lavendula* is sometimes found everywhere in the forests and is recognized by its pale yellow cap, ring on the stalk and bulbous base. Its varietal status describes the pale lavender warts on the cap and the similarly colored patches on the bulb. Less common is the striking fly agaric, which has a bright orange-red cap adorned with yellow warts.

Like the genus *Amanita*, boletes are a dominant component of the summer mycoflora. Boletes resemble typical mushrooms with their cap and stalk, but the underside of the cap has minute pores instead of gills. Unfortunately, they are notoriously difficult to identify to species. Boletes are well represented in the summer by genera such as *Boletus*, *Tylopilus*, *Leccinum*, *Strobilomyces* and *Gyroporus*. In contrast, winter boletes are almost entirely confined to the genus *Suillus*, species of which fruit primarily under pine in Georgia. Most prominent is *S. cothurnatus* with its slimy cinnamon cap and ring that sheaths the lower part of the stalk.

Although *Amanita* species and boletes are most diverse in the

summer, other groups of mushrooms prefer the cooler temperatures of winter. The genus *Hygrophorus*, characterized by thick waxy gills, thrives during the winter months and in southern Georgia is exemplified by the large white *H. ponderatus* and the pink-capped *H. russula*. Rotting logs often harbor wintertime residents such as *Phyllotopsis nidulans*, with its stalkless, fuzzy orange caps and bright orange gills, and the tiny white *Panellus stipticus* that fruits in large shelflike clusters. The latter species has gills that mysteriously give off a greenish bioluminescence in the dark.

Mycorrhizae

Plants are vital for sustaining the world's ecosystems, and without fungi, most plants would not survive or would grow very poorly. The root systems of plants are intimately associated with fungi and together form root-fungus structures called mycorrhizae. In these mycorrhizae the fungal hyphae penetrate and often envelope the young root tips and essentially replace the absorptive root hairs with fungal hyphae that ramify extensively throughout the soil. Hyphae arising from mycorrhizae aid the plant in water and mineral, especially phosphorus, uptake. The plant, in turn, provides a portion of its carbohydrates for the fungus. In temperate latitudes, mycorrhizae of woody shrubs and trees most often involve fungi that produce mushrooms. Hence, it is not a trivial observation that many species of mushrooms fruit only under trees and often only under certain kinds of trees.

Georgia's Coastal Plain contains extensive and diverse forests, and since two strongly mycorrhizal tree

types, oak and pine, dominate the region, the richness of the area for mushrooms is not surprising. In forests where pines and various hardwoods grow intermixed, it is not easy to identify mycorrhizal partners of some mushrooms. When mushrooming I rarely pass up the opportunity to look under isolated trees in fields where the mushroom associations are not confounded by other root systems.

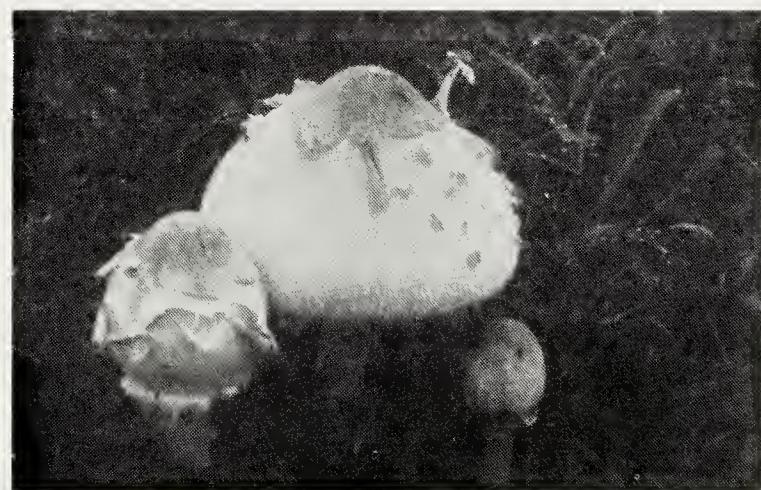
Large and important genera of mushrooms in southern Georgia, such as *Amanita*, *Boletus*, *Hygrophorus*, *Russula* and *Lactarius*, are predominantly mycorrhizal. Particularly striking in the summer is *Lactarius indigo*, which has a blue cap and exudes a bright blue latex when cut with a knife. Its winter counterpart, *L. paradoxus*, also has a bluish cap but exudes a reddish brown latex instead. Species of *Russula* often resemble *Lactarius* but lack latex; the large brown *R. compacta* is particularly abundant in the Coastal Plain.

The most exciting mycorrhizal fungi for me are not the standard gilled mushrooms but, rather, an esoteric group known as hypogeous fungi. These include truffles and trufflelike mushrooms that fruit underground and usually resemble small potatoes. They are scented out by mammals, especially rodents, who dig up and eat their quarry then disperse the spores to the roots of a suitable tree. *Tuber texense*, a true truffle, made headlines several years ago in southern Georgia when it fruited extensively in pecan orchards. In taste trials it compared favorably with the French truffle. Considering the outlandish price of truffles, perhaps someday the pecan nuts will

only be a secondary crop. I commonly find species of *Rhizopogon*, which are mycorrhizal with pines, and have twice turned up *Zelleromyces cinnabarinus*, also under pine. Both of these genera have evolved from above-ground mushrooms with a typical cap and stalk. *Rhizopogon* species have microscopic characters identical to those of boletes, and *Z. cinnabarinus*, with its milky latex and diagnostic spores, clearly evolved from the genus *Lactarius*.

Decomposers

Fungi are major decomposers of organic matter, and without their activities our planet would eventually suffocate from the accumulation of dead plant material. Many mushrooms participate in the decay process. In the



Photograph: Bruce Horn

Poisonous Chlorophyllum molybdites commonly fruits on lawns and pastures.

Coastal Plain of Georgia, fruiting bodies of a half-dozen species of mushrooms can be found on nearly every fallen tree. These include ubiquitous woodrotters such as *Stereum ostrea*, with shelflike multicolored caps that are smooth underneath, and *Trichaptum biformis*, similarly shaped but with small purple-tinged spines beneath the caps. The oyster mushroom, *Pleurotus*

ostreatus, is a widely cultivated mushroom of superb flavor that is also commonly found in the wild in Georgia. Wood is inherently nitrogen-poor relative to carbon, so hyphae of the oyster mushroom ingeniously obtain their needed nitrogen by producing tiny droplets of toxin that immobilizes wormlike nematodes in the wood so that they can be invaded.

Other mushrooms grow on decaying leaves and other herbaceous matter. Earthstars open in a starlike manner among the leaf litter and are always an exciting find for me; common species in southern Georgia include *Gastrum saccatum* (photo, p. 2) and *G. quadrifidum*. Lawns and pastures also serve as habitats for certain types of mushrooms.

Chlorophyllum molybdites is certainly worth knowing since it is probably the most frequent cause of mushroom poisoning in the eastern United States. It is a stately mushroom that often fruits in large circular fairy rings, and can be recognized by its scaly white cap and its gills that become greenish with maturity.

Like mycorrhizal mushrooms, decomposers can be extremely specialized in their growth preferences. The small white mushrooms of *Strobilurus conigenoides* fruit only on fallen magnolia cones, as does the branchlike *Xylaria magnoliae*, which has a white coating of spores early in development and later becomes entirely black. Similarly, fallen pine cones sometimes support the small brown caps of *Baeospora myosura*.

Parasites

Most mushrooms that are parasitic occur on trees, where they may eventually kill their hosts. These tree

parasites mostly comprise the tough and woody polypores, which, like boletes, have minute pores under their caps. In the fall I commonly find the hairy, rusty-brown caps of *Inonotus quercustris* arising from wounds high on the trunks of living water oak (*Quercus nigra*). This mushroom was first described in 1985 from Louisiana. Water oak may also support the perennial woody conks of *Phellinus robustus*, which instead tends to fruit around the base of the trunk.

A few mushrooms parasitize other fungi. During December and January in southern Georgia, it is not unusual to find large troops of *Cordyceps capitata* among the leaf litter. Most species of *Cordyceps* attack insects and spiders, but *C. capitata* is a notable exception. *C. capitata* has a shiny black head that is supported by a yellow stalk. Careful digging is required to follow the stalk deep into the soil and unearth the attached deer truffle, *Elaphomyces granulatus*. The deer truffle, which is mycorrhizal with neighboring trees, is sometimes reduced in size by this parasitism.

Clearly, the mushrooms of Georgia's Coastal Plain are not only diverse in their appearance but in their seasonality, habitat and nutritional mode as well. For their uniqueness and beauty, as well as for their relationships with green plants, mushrooms are a group worthy of greater attention.

Useful Mushroom Guides for Georgia

Lincoff, Gary H., The Audubon Society field guide to North American mushrooms, Knopf, 1981.

Metzler, Susan and Van Metzler, Texas mushrooms, University of Texas, 1992.

Weber, Nancy Smith and Alexander H. Smith, A field guide to southern mushrooms, University of Michigan, 1985.

Monkeying Around

By L. Scott Ranger

There is a saying, "There are two kinds of people: those who divide folks into two kinds, and those who don't." Most plant people are the dividing kind, since we have a strong desire to label and classify everything. We even justify this urge by calling it the science of taxonomy. One characteristic of what is considered good taxonomy is being strictly dichotomous, that is, always dividing into two alternatives.

All this relates to the monkey-face orchid in two ways, each then splitting into two. First, orchids as a group hold a special fascination for many plant lovers, especially when the quality of rareness enters. Because of that passion, other plant lovers look with disdain on all the fuss lavished on the orchids, feeling that many groups have qualities that are equally fine, just overlooked. Second is the issue of taxonomy, and monkey-face is at the center of an imbroglio on both the generic and specific levels: Is it a *Platanthera* or a *Habenaria*, and is it a good species? More on taxonomy later.

Monkey-face is a strikingly beautiful plant and flower. The

fascination of this orchid is easily understood because of the stark beauty of the single stem, with strap-shaped leaves of diminishing size working their way upward and topped by some of the most dazzling white flowers nature has created. The flowers are like brilliant lights in many of the dark haunts of monkey-face. The flower is at once simple and complex. Its lines are perfectly symmetrical and flowing; its white color, the representation of purity. This apparent simplicity hides the great complexity of the orchid flower.

Monkey-face and Orchid Flower Morphology

For those whose memory fades when confronted with words like *pollinia*, *resupinate*, *labellum*, and *column*, here is a quick review of what makes an orchid an orchid using the flower of monkey-face as our illustration. The drawing is reprinted by permission from *The Native Orchids of the United States and Canada, excluding Florida* by C. A. Luer, page 186, copyright 1975, The New York Botanical Garden, with labels added.

The **labelum**, or lip, is the middle petal enlarged and modified in shape from the others. It can be about any shape imaginable, and some defy imagination. The “slipper” of ladies-slipper orchids is the lip.

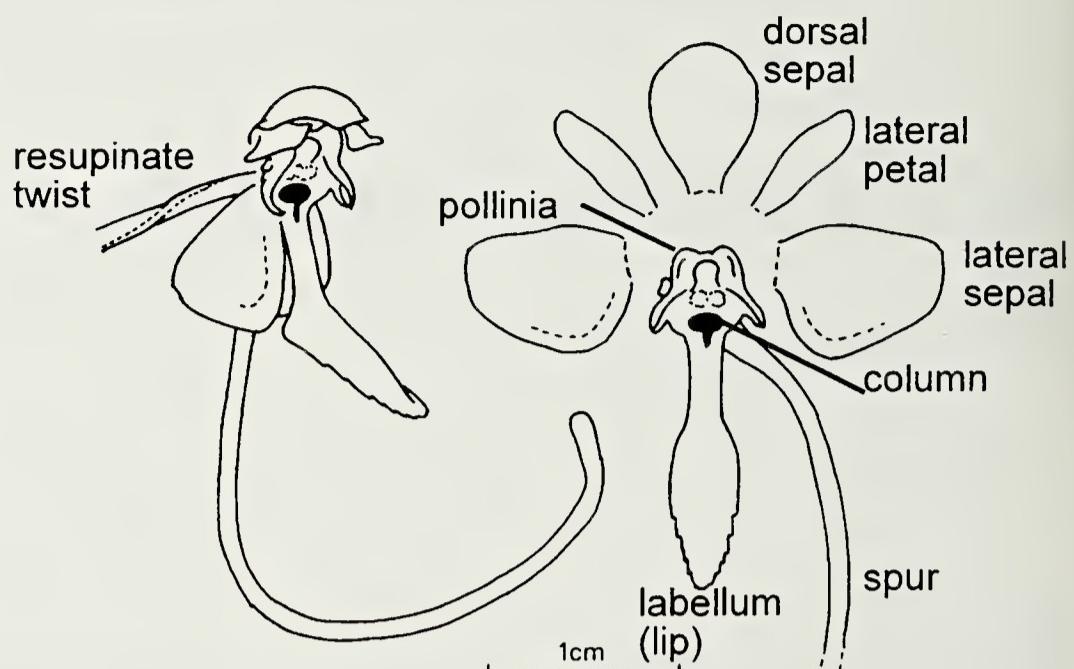
The **spur**, conspicuous on monkey-face, is a nectary and part of the lip modified into a tube, with a gland that produces nectar at the bottom.

The **column**, or gynandrium—the feature that most typifies orchids—is comprised of the style (thin part of pistil that connects ovary to stigma, the sticky pollen-gathering surface) and the filaments of one or more stamens (in monkey-face, two). The column can take on many forms and at first look is a most confusing flower part. Gynandrium literally means female (*gyn*) and male (*andros*).

Pollinia (singular: *pollinium*) are waxy masses of pollen found near the top of the column. If one pulls the pollen mass from the monkey-face flower, it usually comes out a **pollinarium**, the complete set of male flower parts. The pollinarium is the pollinia, **viscidium** and **stipe**. The viscidium and stipe are sterile parts of the anther that connect it to the column. The viscidium is usually sticky and spring-like so it sticks easily to an insect. On monkey-face, the viscidium can be played with much like a slinky toy!

Resupinate orchid flowers have the lip on the lower side because the pedicel (flower stalk) is twisted 180°. Essentially, resupinate flowers are upside down. *Calopogon* orchids are hyper-resupinate, having the lip on top since the pedicel is twice-twisted, and are “right-side up.” Monkey-face is “upside down,” with lip on the bottom.

Monkey-face Flower Morphology



Orchids are trimerous (having parts in threes) monocots, with three sepals that can be green, or brightly colored and petaloid (petal-like), and a corolla of three petals, one of which is usually highly modified into a labellum (lip). The androecium (male flower part) is made of one or two stamens whose anthers appear much like a cap where pollinia form. The

gynoecium (female flower part) is formed of three united carpels in an inferior ovary. The stigmas and styles along with the androecium form the column. Having said this, orchids show an amazing number of variations on this theme; many are modified to mimic insects, and to the untrained eye present a flower with unrecognizable parts!

Monkey-face is an orchid with a fairly simple flower. Petals and sepals are all white and petaloid. The large lateral sepals (9mm x 7 mm) sweep backwards behind the lip (13mm x 3 mm), which gracefully drops straight down for half its length, then bends outward at about 45°. The lip is somewhat concave downward and spatulate in shape, with the edges finely serrated. A very conspicuous part of the lip is the spur, 4-5 cm long and curving dramatically outward. The dorsal sepal (8mm x 6 mm) forms a hood over the column. The lateral petals (9mm x 7 mm) are inserted under the hood of the dorsal sepal.

Taxonomy

Monkey-face was first collected in 1840 by S.B. Buckley as indicated by a Harvard University Gray Herbarium specimen from Georgia. Another early collection at the Field Museum Herbarium (Chicago) is from Alcorn County, Mississippi, by J.T. Stewart in 1863. Both of these were identified as *Habenaria blephariglottis*, known as white fringed orchid, but the herbarium specimens show no fringing. In 1910, O. Ames mentioned a form of *Habenaria blephariglottis* with an entire unfringed labellum in *Orchidaceae: Illustrations and Studies of the Family* in a section on the genus *Habenaria* in North America, but he did not name it.

In 1941 D. Correll published *Two New American Orchids* in which he formalized monkey-face as a variety of white fringed orchid, making it *Habenaria blephariglottis* (Willdenow) Hooker var. *integrilabia* Correll. He based this name on a type

specimen from McCreary County, Kentucky, collected by H.J. Rogers in 1939. Monkey-face no longer grows at this site, probably due to overcollecting by botanists. The University of Kentucky distributed a huge number (in the hundreds) of herbarium specimens from this site as isotypes (plants collected at the same site and time as the type specimen) in a plant exchange program.

Carlyle A. Luer is a surgeon who is a serious amateur orchidologist. The New York Botanical Garden published his *The Native Orchids of Florida* in 1972 and *The Native Orchids of the United States and Canada, excluding Florida* in 1975. These are folio-size books, lavishly illustrated with line drawings of great detail and marvelous photographs taken mostly by the author. Dr. Luer wandered the Florida peninsula for many years orchid hunting, and with the success of the first volume, went on to the rest of the continent! While these are the works of an amateur, they rank among the best botanical books ever written, and illustrate what someone with talent who is really interested can do.

In his second volume he recognized monkey-face as a distinct species and transferred it to *Platanthera* as *P. integrilabia* (Correll) Luer, a new species and in a new genus. Luer followed the thinking of L.C.M. Richard, a French botanist, who split *Platanthera* from *Orchis* and *Habenaria* in 1818, because members of this group have a broad anther. *Platanthera integrilabia* is the commonly accepted name at present.

However Gleason and Cronquist in *Manual of Vascular Plants of*

Northeastern United States and Adjacent Canada, published in 1991, following their previous practice, don't recognize the genus *Platanthera*. They gave monkey-face the new name, *Habenaria correllii* Cronquist because the combination *H. integrilabia* would have been too similar to the name of a different species, *H. integrilabris* J.J. Smith. A comparative study is now underway by V. Albert at the University of North Carolina using DNA analysis, morphological features and ontogeny (the course of development) of the different species to evaluate the distinction between *P. integrilabia* and *P. blephariglottis*. Awaiting better evidence, I'm sticking with *Platanthera integrilabia* as a species.

Habitat

Monkey-face generally likes an area with black, mucky, acidic, organic soil. It is found most frequently in bogs at the head of streams or seepage slopes. These mucky areas need to be wet nearly all year and over most years. Most sites are under a heavy canopy of deciduous woods where light is low in intensity. *Sphagnum* moss is the most consistent plant associate, and where it occurs would be a good place to search for monkey-face. In Georgia, other good associates are royal fern (*Osmunda regalis*), which is found at every site, and woodland rein orchid (*Platanthera clavellata*). L. Zettler makes the guess that rein orchid provides the fungal inoculant for the roots of monkey-face. Rein orchid is very common and does not have the specific needs of monkey-face, but if you find a rein orchid, do look carefully for monkey-face.

Distribution

Sixty-six populations of monkey-face have been found, but only forty-three exist today, with eight of these populations in Georgia. In the summer of 1991, Margaret Shea, of the Kentucky Endangered Plant Species Program, conducted a survey of monkey-face sites for her status report on the orchid for the U.S. Fish and Wildlife Service. She solicited the help of several Botanical Society members, including myself, David Emory, Tom Patrick and Jim Allison in scouring Georgia for all the monkey-face sites.

Monkey-face is a very rare plant. Orchids as a group are highly sought after by fanciers, and the rarer the taxon the more desired it is. The "mother lode" of monkey-face on Starr Mountain, Tennessee, gives ample evidence of how much monkey-face is coveted by collectors, as crater after crater is visible where the orchids have been dug up! The following description of monkey-face sites in Georgia is purposely vague so that this article will not serve to promote their demise.

Rabun County has the most robust colony, and it is probably the best protected site in Georgia. Many of the descriptions of this site had it in Habersham County, but evidently those people didn't have good maps, for the bottom of the gorge is the county line, and all the monkey-face are on the northeast side of the river! This site is owned by Georgia Power and is currently part of the property being leased to the state of Georgia for a new kind of state park on private land. Georgia Power has been an excellent steward of this property, and monkey-face is in good hands here.

L.L. Gaddy and L. Zettler have been monitoring the plants at this site for some time, and most have been tagged. In 1988 Gaddy found 699 vegetative stems of *Platanthera* of uncertain species and thirty-nine *P. integrilabia* with blossoms. During a survey of the site in 1990, this author and others counted sixty-eight plants blooming, but no careful tally was made in 1991 although the population was healthy. This site

differs from the other Georgia locations in that here the plants are in direct sunlight on a southwest facing slope, and their inflorescences have more flowers (up to twenty). It seems likely that the constant water seep on a cool slope provides an alternate habitat.

Stephens County. Lee Mountain is in a part of the Chattahoochee National Forest logged within the last decade, but the Forest Service seems interested in protecting monkey-face. In 1990 our survey found nine plants in flower, and there were eleven blooming in 1991. The plants are confined to the black muck areas of a small creek, and the area is being encroached on by *Arundinaria tecta*, our native bamboo grass. This historic site was relocated in 1990 with the help of Larry Murley who rides his motorcycle on the mountain logging roads and knew the flower when it was described to him. Other than the very small size of the suitable habitat, the site seems secure.

Forsyth County may be our most depauperate site. Jim Allison found

the plant in flower in 1990, but our 1991 survey only found nine strap leaves and two stems with aborted flowers. I found a single inflorescence with six flowers in 1992, and none on a Georgia Botanical Society field trip in 1993, although survey markers were all

around. The few plants are located at the point of a triangle where two small streams merge and is close to a road, and the already poor site looks like it will

get worse. This population is the least secure of all.

Cobb County was featured in our Spring 1990 *Tipularia* as the site of an historic station for monkey-face that I was able to relocate in 1989, when it had three flowering plants. Since then, the lower area has become a small dam and the upper area blooms only irregularly, with none in 1993, when it was surveyed on a Botanical Society field trip. The site belongs to the estate of a man deceased for about nine years, and the property could be converted to home sites at any time.

Coweta County. Moore Creek drains a significant flatrock gneiss outcrop leading to large surges of runoff in heavy rains. Monkey-face is in the woods below that are recovering from logging about twenty years ago. The property is owned by Inland Rome Paper Company and leased to a hunting club. David Emory first located monkey-face here in 1985 when alerted by an acquaintance who found an unusual white orchid there. In 1991 we found

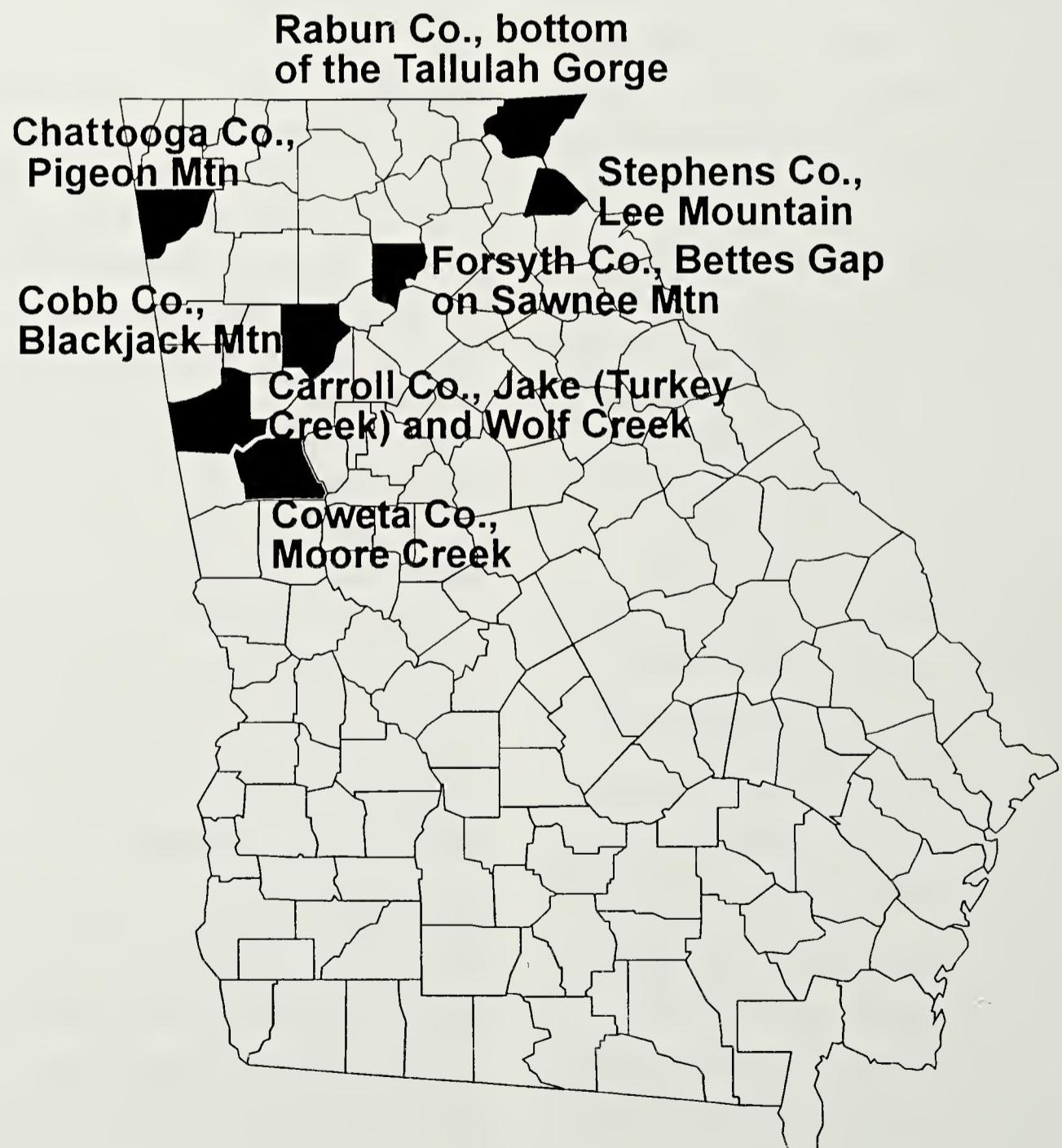
Crater after crater is visible where the orchids have been dug up!

seven plants in flower, and in 1993 David helped remove two plants for use as models for a sculpture to highlight Georgia's rare plants (see "Sculpting A Niche" in this issue). These plants will end up at the Atlanta Botanical Garden, where Ron Determann hopes to propagate the species.

Carroll County has three populations. Two are on Turkey Creek near Jake, on property owned by Georgia Pacific. Twenty acres have been placed in the Nature Conservancy's Natural Areas

Registry Program, and the company is cooperating on a management plan for the plant. These locations were found by Billy Grant in 1975, and the larger regularly produces up to seventeen flowering plants, making it the second best site in Georgia. In a search of Georgia herbaria, Tom Patrick found a herbarium specimen at West Georgia College from Wolf Creek, making the third population. Repeated searches of the area have failed to find flowering plants, although in 1991 a deer-browsed flower stalk was found that could be

Monkey-face Orchid in Georgia



Map: L. Scott Ranger

monkey-face. Deer browsing is a serious threat at several sites.

Chattooga County produced a surprise location when Henning Von Schmelling of the Chattahoochee Nature Center found seven plants flowering in 1992. The status of this site is uncertain as it is a roadside ditch on Pigeon Mountain. Other species of *Platanthera* grow there so identification of non-flowering species is virtually impossible.

Conclusion

This review of monkey-face populations clearly indicates its threatened status in Georgia. Only the Rabun County site seems totally secure, given the size of the population and the land management. Turkey Creek in Carroll County shows great promise. The other sites are uncertain at best, with threats from habitat destruction and the precarious population size.

The specific needs of monkey-face are not well enough known to develop a management plan. It grows under closed canopies, but is it a remnant from times when the canopy was more open, or is it really best suited to less light? Would it do better if there was some management to open the canopy? We only have clues to these answers from limited evidence at the sites. Disturbance in the recent past is a common factor at nearly every site. The poorer site at Turkey Creek could be used as a management experiment plot to answer some of these questions.

Monkey-face was added to the state protected list in 1993. The conclusion of the Status Survey Report by Margaret Shea is that the plant is deserving of federal protection. I am anxious for the day it receives recognition under the Endangered Species Act.

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Pink Ladies to Hairy Rattleweed

By Miriam Talmadge

There is a seemingly endless variety of blossoms to be found in our wildflowers. Everyone knows what a haughty pink lady slipper looks like, but have you ever seen a hairy rattleweed? With a name like that, it's no wonder this poor plant languishes on the endangered lists.

These plants and many, many more may be seen in George Sanko's wildflower garden at DeKalb College's South Campus. This garden is now four years old, and George says that "it just grew." But these serene and beautiful blossoms give a hint to the arduous work that made them grow.

Here you will find a thousand native plants, which probably makes it the largest collection in Georgia. There are over sixty-five species of ferns, the outstanding group, eighteen native azaleas, fourteen species of trillium, eight blue stars, seven wild gingers, and a hundred plants that are considered rare or endangered—fourteen species from the federal list, sixteen from Georgia.

George Sanko taught biology and botany at DeKalb College for twenty-four years. It was a pleasant teaching

career, and when he retired four years ago he decided to go on teaching some botany. A move to the college's South Campus gave him more ground space.

A handful of his students wanted to make a Nature Trail, and he went along with the idea, wanting to do something a little different. It was really the students' idea that got him started digging in the dirt. They set out fifty wildflowers, which did well. Watching these flowers grow made something happen to George. Every opening blossom was new and exciting. George was hooked; he was making life happen! This kind of enthusiasm can move mountains. George did not exactly move mountains, but he did move an awful lot of dirt. "Whatever you're planting, soil is the most important factor. You've got to get it right."

For that initial effort the College gave him \$800 to buy seeds and plants. But there was no other money. When George first set out to clear this half-acre, the work was really back-breaking. Then he had a bright idea. He gave his second quarter botany class an option: They could



Photograph: Dottie Colettrain

George Sanko and Thelma Glover care for thousands of native plants growing in raised beds in the botanical garden at DeKalb College, South Campus.

have conventional lab, or they could work in the garden. Without hesitation they all chose the garden. When they got out there and saw the staggering amount of work that was involved, they wanted to go back to the lab. But it was too late. All the clearing was done by hand, and it took two years. The privet still comes back, as privet will.

After his first seeds came up, George started to work with cuttings. He had never done this before, but it worked. He used hormones. He watched and learned by experience. In his words, "Botanists, even field botanists, know less about growing plants than anybody. They're the bottom. You just have to see plants grow. I've learned so much more in the past four years than I ever learned in college. That's what I like—you learn so much."

Some people think wildflowers are hard to grow, and George admits, "Spring flowers are hard, lady slippers, trillium, all the fancy ones. But some of the summer and fall plants are the easiest thing in the world to grow. Ferns are easy. And some of the endangered species, we've had real good luck propagating. The smooth coneflower (*Echinacea laevigata*) grows like a weed. So does the Tennessee coneflower (*Echinacea tennesseensis*)."¹ George has two hundred of these. The federally endangered Barbara's buttons (*Marshallia mohrii*) propagate "like it's going out of style." George has also propagated hairy rattleweed (*Baptisia arachnifera*), Cumberland rosemary (*Conradina verticillata*) and Virginia spirea (*Spirea virginiana*), all with cuttings.

Tom Patrick (Department of Natural Resources botanist and Georgia Botanical Society member) took George out to get some cuttings of the very rare Virginia spirea. George was not sure how to propagate this rare plant, whether to use Rootone, Dip-and-Grow, or what. Then it dawned on him that the plant is related to nine-bark (*Physocarpus opulifolius*). Since nine-bark propagated easily, Virginia spirea should do the same. This turned out to be the case.

If you do not set out plants in their natural habitat, with the amount of sun or shade they prefer, you will need to compensate with a lot of watering. George acknowledges, "In this location, half way between the coast and the mountains, I have been able to successfully grow plants not quite in their natural habitat."

George now has a staff of three people to help him with the garden. Thelma Glover takes care of the greenhouse, and will replace George when he finally retires. Her son, Jason, has a youthful, strong back that gets a lot of work done, and Cathy Reisberg is a very efficient assistant.

In January of 1993 this garden project got a big break. George received a grant of \$25,000, to be paid out over a period of five years. This bonanza did not just happen; George went after it. The money was given anonymously, and the donor stipulated that it be spent on plants and on developing the grounds. No staff salaries. And there was also a request that endangered species be propagated. This is a venture that George has had outstanding success with. Later on, he plans to

reintroduce these plants into the environment. A private company has offered to pay for this planting. Meanwhile, endangered species sell very well at the two annual plant sales.

The garden is now half finished. The next big project will be for George to build a meadow this fall. It will cover two acres. "Again we will have to clear and burn the hard way," he indicates determinedly. "I plan to seed this tract with annuals and perennials, mostly old favorites like Queen Anne's lace, black-eyed Susan, bachelor's buttons, coreopsis, various coneflowers. I will use some greenhouse 'plugs,' to be sure." Roundup will be used to control grasses. The grass will be mowed at the end of summer, and the unwanted plants will be selectively killed with Roundup, which does not hurt soil or dormant plants.

Two bridges will be built, with a walkway into the floodplain. This will be primarily for bird watchers. The wetlands (which are dry in summer) will not be disturbed. When the meadow is finished, the garden will cover six acres.

While the meadow is growing, new beds and areas will be developed over the next couple of years. Hundreds of new species will be added. George's ultimate hope is to have between 1500 and 2000 species in this garden.

George often emphasizes that this whole garden is a teaching tool. In addition to the college students, elementary students and senior citizens also enjoy these flowers. It will never be a "don't touch" garden. Children use the greenhouse, where they are supplied with pots, soils and



The garden is designed as a teaching tool where children and adults are supplied with pots, soils, seeds and instruction to grow their own plants.

teachers are taught how to use the greenhouse. By next year, there will be ten or fifteen elementary schools using the garden.

There will be more Continuing Education courses. The demand for classes is incredible. Among courses offered by Continuing Ed are Identification of Fall Wildflowers, How to Identify Native Ferns, Identification of Spring Wildflowers and Identification of Native Trees and Shrubs. A lot of workshops are also planned, and there are Sunday afternoon walks for trilliums, azaleas, endangered species, ferns and early spring flowers. And then of course

seeds. They can thus grow their own plants, with help from teachers and the occasional parent. The students can take these plants back to beautify their own school grounds. George says there are plenty of plants, so that if a few get pulled apart in the scramble, it won't matter. The

every spring there is Wildflower Week. Lots of publicity in the papers, field trips, tours of the garden, a faculty cookout. And the spring Plant Sale is that week. There are two plant sales a year, spring and fall. George encourages people to come to the garden often and look around: "I will tell them where they can buy plants, and how to grow them. I would like to educate any Atlanta gardeners who want to come out here and learn something."

The secret of George's unqualified success is hard to fathom. Does he have a magic green thumb? Everything he touches seems to flourish. And his enthusiasm is so catching, I don't believe anyone could follow him around his radiant garden, while

he explains his treasures, without wanting to dash home and start his own—he makes it look so easy!

For anyone who would like to accept George's invitation, the Botanical Garden is at DeKalb College's South Campus in Decatur, just outside the southeast "corner" of the Perimeter. Take I-285 to Exit 36, Flat Shoals Road, and follow the signs to the college. Those who would like to be on the mailing list may send their names and addresses to:

DeKalb College Botanical Garden
3251 Panthersville Road
Decatur, GA 30034

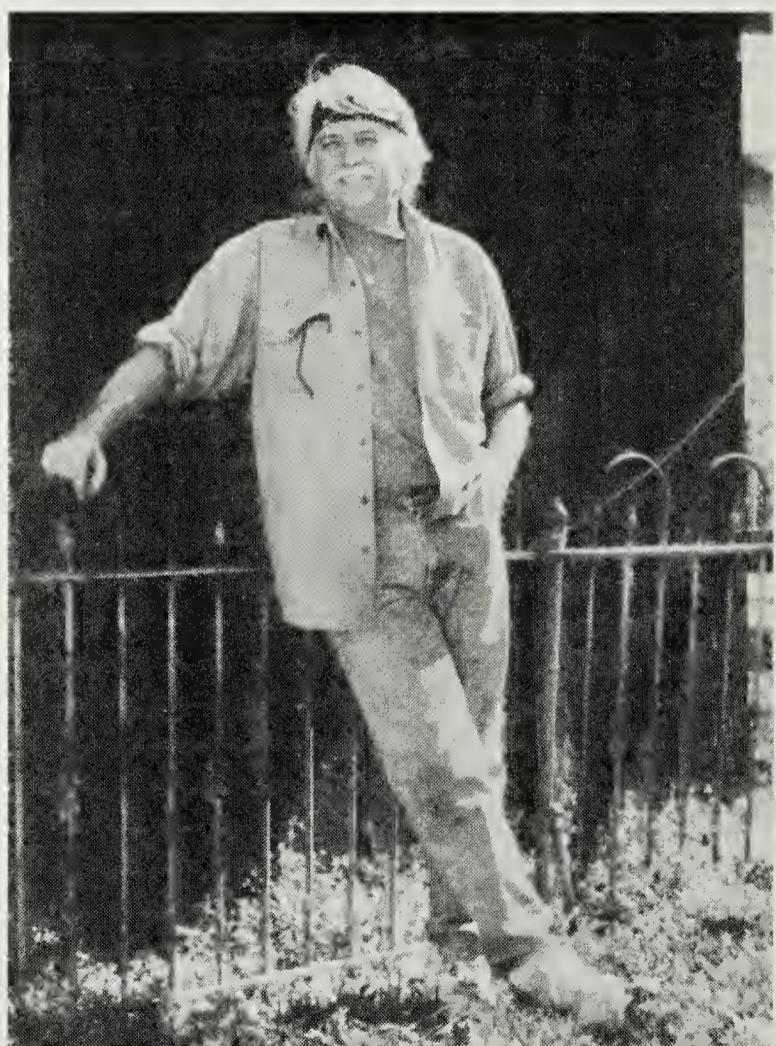
Sculpting a Niche

By Sally Emory

Named for being the second-born instead of the first, Trailer McQuilkin has carved out a niche for himself in which he can be first, that of environmental sculptor. Photographs of his work are on the cover and centerfold of this issue. They are from a collection of Georgia's indigenous, rare and/or endangered plant sculptures that Trailer is currently creating for Deen Day Smith. The collection will eventually be on display for the enjoyment and education of the public.

Unlike many people who seem to be "born" artists, Trailer went through the 1960's as a high school surfer and college business major. Realizing that business, or maybe college, was not for him, Trailer left to find his future elsewhere. While working as a photographer in 1969, he took on a part-time six-week job for an artist who worked with tin. Using what he learned from that experience, Trailer then tried his hand at metal sculpture, making a flower to impress his then-girlfriend, now-wife, Sharon. While Trailer is quick to say that the flower was a poor attempt, Sharon was clever enough to see

what could be and urged him to make sculptures for sale. When his aunt, who ran a gift shop, bought five sculptures at ten dollars each to see how they would sell and sold out in two hours, Trailer's future as an artist was born.



Photograph: Suzanne Schneidau

Trailer McQuilkin, at home in Mississippi, where there is wife, Sharon, two children, cats, dogs and alligators nearby.

At that time, Trailer was making single flowers, but he soon realized that more complex sculptures would have more interest, so he began making smaller versions of the type of groupings he does today. To gain exposure, Trailer presented shows wherever he could, frequently in gardens and museums. Such shows sold his sculptures and led to individual commissions. The early groupings were modeled from flower pictures in books and were selling for \$50-\$150. He began in New Orleans, but soon did shows in other places and, in 1972, created the Easter window and fall displays at Tiffany's in New York City.

In 1974, casting about for a new theme that would sell, Trailer proposed to the Louisiana Bicentennial Commission that he sculpt wildflowers of Louisiana for display in that state's 1976 celebration. He landed a commission for his first collection of sculptures, which were later donated by Mrs. Edgar B. Stern to the Longue Vue House and Gardens in New Orleans. This was the first time he worked from real flowers instead of from pictures in books. As a side note: When Mrs. Stern sent her housemaid-in-charge-of-flower-arranging out to look at Trailer's sculptures and she inquired as to how one kept them watered, Trailer knew his work was much improved over five years earlier!

After this heady experience, it was

back to museum shows and individual commissions. Fortunately, the early 1980's were a time of awakening in the United States with regard to endangered plants. Judy Freeman commissioned Trailer to do a collection of twelve sculptures of the rare and endangered plants of the Gulf area, to be displayed at that year's annual Garden Clubs of America meeting, which was held in New Orleans. This project was the first in which Trailer became involved with botanists and gained access to sites of rare plants. He began a practice which he continues today of collecting the plants with roots

intact, so that he can see them as he works and watch them in all stages of bloom. He then returns them to their same habitat or to a botanical garden for propagation and study. The monkey-face orchid on the cover was done from plants collected in Coweta County that now reside in the Atlanta Botanical Garden. Trailer emphasizes that he could not have done his work here in Georgia without the assistance and cooperation of Tom Patrick, head of Georgia's Heritage Inventory program, and Ron Determann, Atlanta Botanical Garden Conservatory Superintendent.

Collection of Indigenous, Rare and/or Endangered Plants of Georgia

When the Atlanta Botanical Garden unveiled its new visitor center in 1985, Trailer's pieces displayed therein so impressed the

late Ann Crammond, then director of ABG, that she brought Deen Day Smith to see them. Although the pieces on display had been sold, Ms. Smith commissioned Trailer to make another collection for her. More recently, she commissioned him to make a collection of twelve of the indigenous, rare and/or endangered plants of Georgia. This collection is meant to awaken the public as to what wonderful plants are in this state. The message is: If we don't take care of the areas where these plants grow, this is what we can lose. The original collection of twelve will be finished by the end of 1994, but Ms. Smith has now authorized Trailer to enlarge the collection. It is through her generosity that we are able to include in this issue of *Tipularia* not only the color cover, but also a center-spread of color photographs of some of Trailer's work from her Georgia collection.

Although his original mentor worked in tin, Trailer uses copper wire and sheet copper to form his sculptures. The colors are rendered using metal primer and oil paints. To the copper items, which make up nearly all of the sculpture, Trailer adds some natural materials, such as sticks, stones and pine cones. One type of plant is the focus of each piece, but replicas of companion plants are

included to create a whole botanical environment. In addition to entire plants, there is ground litter including leaves of canopy trees appropriate to the habitat. Occasionally actual snake skins or bug skeletons are added to round out the setting. For a natural appearance, Trailer sculpts some leaves showing insect damage and other blemishes. Each sculpture takes about two months to create; however, if he misses the blooming period, he has to wait another year to acquire the plant, as he tries to show bud, bloom and fruit.

Trailer and Sharon run a fine arts gallery in Ocean Springs, Mississippi, called Art Who?, featured recently in *Southern Living* magazine.

The "trailer" has obviously now become a leader in sculpting natural settings. Trailer says that while many people do flower sculpture, he does not know of anyone else doing whole environments. After the New Orleans Garden Club show, for which he first sculpted from plants from their natural habitat, Trailer saw his future summed up in the message in his fortune cookie: "You'll have a flowering road to glory." And luckily for us, he has followed that road, and there are philanthropists like Deen Day Smith who make it possible for us to enjoy the fruits of his labor!

Cover and Center Spread Photos

- Cover: Fringed gentian (*Gentianopsis crinita*) is found at the base of Brasstown Bald where serpentine rock outcrops occur; monkey-face (*Platanthera integrilabia*) is found in seven Georgia counties.
- Page 21: Purple honeycomb head (*Baldiuina atropurpurea*) is restricted to pitcher plant bogs in south Georgia.
- Page 22: Relict trillium (*Trillium reliquum*) occurs on hardwood slopes along the Fall Line and the lower Chattahoochee River.
- Fringed campion (*Silene polypetala*) is found in rich hardwood forests along the Flint and Ocmulgee Rivers.
- Page 23: Rose gentian (*Sabatia capitata*) only grows in a small area where Alabama, Tennessee and Georgia join, centered around Lookout Mountain.
- Page 24: Monkey-face orchid (*Platanthera integrilabia*) is most frequently found in bogs at the head of streams or seepage slopes with black, mucky, acidic, organic soil.



Purple honeycomb head





Rose gentian



Monkey-face orchid

Orchids, Orchids, Orchids

By David L. Emory

How many kinds (taxa) of orchids are known in Georgia? The answer changes with time as new kinds are discovered in the state, or kinds considered different in the past are reduced to synonymy, or types previously thought to be the same are found to be different. As they often do, taxonomists can disagree with each other, and the answer is, therefore, somewhat subjective. Question: What is a species? Facetious answer: What a qualified taxonomist says it is.

In this article, the twenty-three genera of orchids in Georgia are divided into fifty-five species, of which there is a second variety in three and one hybrid. Thus there are fifty-nine taxa, or kinds to which scientific names have been applied. The following list provides the scientific and common names for each of these taxa, as well as a general statement of its range and frequency in Georgia.

Aplectrum hyemale (putty root), infrequent, in scattered locations; northern one-third of Georgia

Calopogon barbatus (bearded grass-pink), a dozen or so locations; southern one-third of Georgia

Calopogon multiflorus (many-flowered grass-pink), very rare, not seen for many years; lower coastal plain

Calopogon pallidus (pale grass-pink), rare; lower coastal plain

Calopogon tuberosus (grass-pink), throughout the state but mostly in southern one-third

Cleistes divaricata var. *bifaria* (small spreading pogonia), rare; northernmost Georgia

Cleistes divaricata var. *divaricata* (large spreading pogonia), a dozen or so locations; southern one-third

Corallorrhiza maculata (spotted coral-root), very rare (not seen for many years); northernmost Georgia

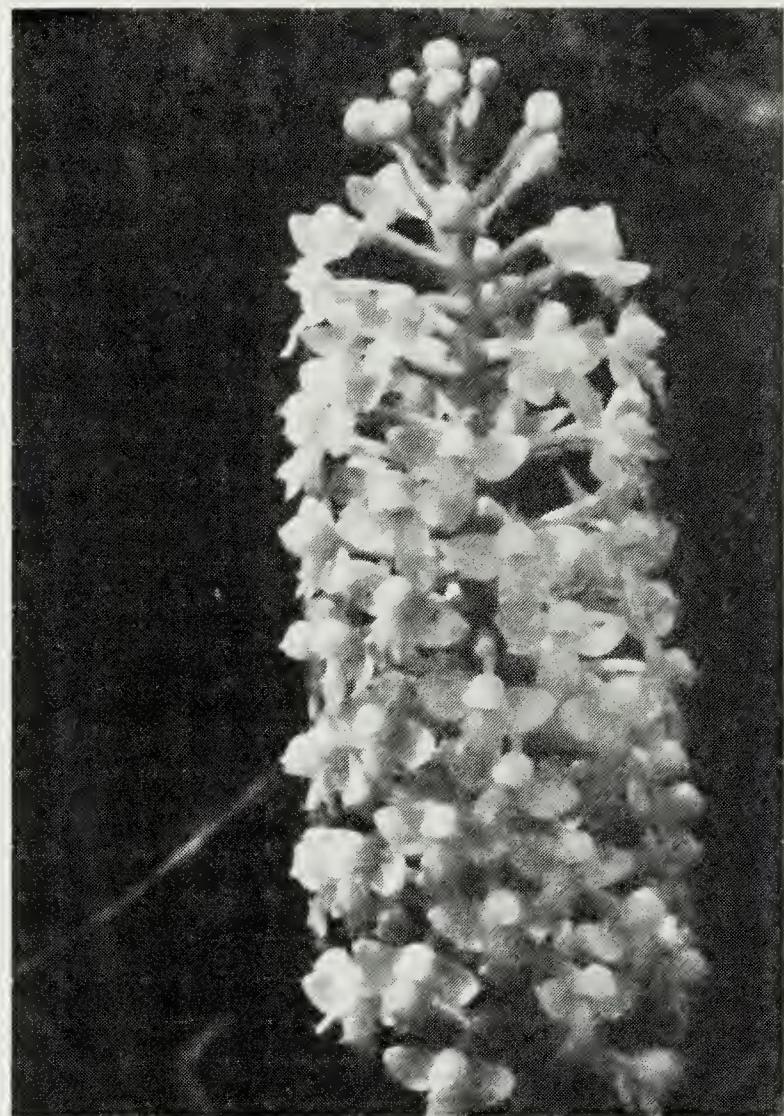
Corallorrhiza odontorhiza (autumn coral-root), recorded in a few counties, mostly in northeast Georgia (probably more common, but inconspicuous)

Corallorrhiza wisteriana (spring coral-root), a dozen or so locations concentrated in the southwest but also in the north and east

Cypripedium acaule (pink lady's-slipper), occasional; northern one-third of Georgia, perhaps becoming more abundant where formerly-cleared land is reverting to pine woods

Cypripedium parviflorum (small yellow lady's-slipper), six counties; northern

one-half of Georgia
Cypripedium pubescens (large yellow lady's-slipper), fewer than a dozen counties; northern one-half of Georgia
Epidendrum conopseum (green-fly orchid), occasional, often overlooked; southern one-third of Georgia
Eulophia alta (wild coco), very rare; southwest Georgia
Galearis spectabilis (showy orchid), several locations; northernmost Georgia
Goodyera pubescens (downy rattlesnake plantain), common, northern one-half of Georgia; apparently ignored in some cases by collectors who assume it has already been recorded
Habenaria quinqueseta var. *quinqueseta* (long-horned habenaria), two locations; south Georgia
Habenaria repens (water-spider orchid), a dozen locations; mostly southern one-third of Georgia
Hexalectris spicata (crested coral-root), nearly a dozen locations; mostly northern one-half of Georgia
Isotria medeoloides (small whorled pogonia), a dozen locations; northernmost Georgia. Discovery of this, Georgia's only federally-listed orchid, is recent, but it is apparently not so rare as some of the others.
Isotria verticillata (large whorled pogonia), half a dozen or so locations; mostly northern one-half of Georgia
Liparis lilifolia (lily-leaved twayblade), occasional; northern one-third of Georgia
Listera australis (southern twayblade), nearly half a dozen locations; western one-third of Georgia, from the Atlanta area south to Florida
Listera smallii (kidney-leaved twayblade), rare; northernmost Georgia
Malaxis spicata (Florida adder's-mouth), very rare; southeastern Georgia
Malaxis unifolia (green adder's-mouth), widespread, mostly northern two-thirds of Georgia; one of the most common



Yellow fringeless-orchid

orchids in Georgia

Platanthera blephariglottis var. *conspicua* (large white fringed-orchid), a dozen locations; mostly southern one-third of Georgia, but some also northeast
Platanthera x chapmanii (Chapman's hybrid orchid), very rare; southeastern Georgia
Platanthera ciliaris (yellow fringed-orchid), frequent; widespread throughout Georgia, but rare in Piedmont
Platanthera clavellata (little club-spur orchid), apparently absent from most of the Coastal Plain, frequent and widespread in the rest of Georgia
Platanthera cristata (orange-crest orchid), more than a dozen locations; southern two-thirds of Georgia
Platanthera flava var. *flava* (southern rein-orchid), a dozen scattered locations; southern three-quarters of Georgia
Platanthera flava var. *herbiola* (tuberclued rein-orchid), very rare; north Georgia

- Platanthera grandiflora* (large purple fringed-orchid), very rare; northern Georgia
- Platanthera integra* (yellow fringeless-orchid), nearly a dozen locations; southern one-third of Georgia
- Platanthera integrilabia* (monkey-face orchid), nearly a dozen locations; northern one-third of Georgia
- Platanthera lacera* var. *lacera* (ragged fringed-orchid), nearly a dozen locations; northern two-thirds of Georgia
- Platanthera nivea* (snowy orchid), nearly twenty locations; mostly southern one-third of Georgia
- Platanthera peramoena* (purple fringeless-orchid), very rare; northern Georgia
- Platanthera psycodes* (small purple fringed-orchid), very rare; northern Georgia
- Pogonia ophioglossoides* (rose pogonia), nearly two dozen locations; mostly southern one-third of Georgia
- Ponthieva racemosa* (shadow-witch), rare; south Georgia
- Pteroglossaspis ecristata* (crestless plume orchid), rare; outer coastal plain
- Spiranthes brevilabris* var. *brevilabris* (Texas ladies'-tresses), rare; south Georgia
- Spiranthes brevilabris* var. *floridana* (Florida ladies'-tresses), rare; coastal plain
- Spiranthes cernua* var. *cernua* (nodding ladies'-tresses), frequent; widespread throughout Georgia
- Spiranthes lacera* var. *gracilis* (southern slender ladies'-tresses), nearly twenty widely-scattered locations; mostly northern one-half of Georgia
- Spiranthes laciiniata* (lace-lip ladies'-tresses), half a dozen locations; mostly southern one-third of Georgia
- Spiranthes longilabris* (giant spiral-orchid), very rare; southwest Georgia
- Spiranthes magnicamporum* (great plains ladies'-tresses), rare; recently discovered in northwest Georgia
- Spiranthes odorata* (fragrant ladies'-tresses), occasional; southern Georgia
- Spiranthes ovalis* (oval ladies'-tresses), rare; north and south Georgia
- Spiranthes praecox* (giant ladies'-tresses), two dozen locations; southern two-thirds of Georgia
- Spiranthes tuberosa* (little ladies'-tresses), nearly two dozen locations; most parts of Georgia
- Spiranthes vernalis* (spring ladies'-tresses), more than two dozen locations; most parts of Georgia
- Tipularia discolor* (crane-fly orchid)—according to a lack of herbarium specimens—is apparently absent from much of the Coastal Plain, but frequent and widespread in the rest of Georgia. It is the orchid after which this magazine is named.
- Triphora trianthophora* (three-birds orchid), rare; northeastern Georgia
- Zeuxine strateumatica* (zeuxine), a rare escape on the coast



Snowy orchid

Photograph: Christina Bird

Range Limits

The following orchids reach a geographical limit of their range in Georgia.

Northern limit:

Zeuxine strateumatica

Eastern limit:

Spiranthes magnicamporum

Southern limit:

Cypripedium acaule

Galearis spectabilis

Isotria medeoloides

Listera smallii

Platanthera grandiflora

Platanthera psycodes

Some orchids found in the mountains of north Georgia appear to reach their southern limit in this state but actually are found farther south in Alabama, where the mountains extend closer to the middle of the state.

The following orchids have been collected close to the borders of Georgia, in most cases in the mountains of North Carolina or Tennessee. It is likely that eventually some of them will be found growing in our state, and they should be searched for. Some of them have indeed been reported for Georgia, but no specimens have been deposited in herbaria to document their presence.

Arethusa bulbosa

(wild pink; dragon's mouth)

Cypripedium reginae

(queen lady's-slipper)

Goodyera repens

(lesser rattlesnake plantain)

Liparis loeselii

(fen orchid)

Spiranthes lucida
(shining ladies'-tresses)

The author's subjective list of the most common orchids in Georgia—at least in the region around Atlanta—would certainly begin with *Goodyera pubescens*, *Tipularia discolor*, *Malaxis unifolia* and *Platanthera clavellata*. The rarest would include those, such as *Platanthera peramoena*, which have been observed only once. In some cases, the apparent rarity of an orchid in



Purple fringeless-orchid

Georgia is merely the result of insufficient exploration and collection in many areas of the state. Gradually the gaps will be filled, and some orchids will be seen to be more

widespread than our current records indicate. The dozen records for *Isotria medeoloides* are, for example, the result of a determined search by only a few botanists.

Size

In contrast to the relatively huge tropical orchid flowers that are familiar in corsages and popular with amateur growers, the orchids of temperate Georgia typically have rather small flowers. The smallest, perhaps, are those of the common green adder's-mouth, where as many as fifty tiny flowers form an inflorescence normally not more than two or three inches tall and only one inch in diameter. The largest flower is probably that of the pink lady's-slipper, whose lip (pouch) can be as much as two inches long.

The height of the entire plant covers a wide range, too. Several species, including the same adder's-mouth as well as the twayblades, can be as short as three inches, while some of the *Platanthera* species can be as much as three feet tall.

Habitat

Although we know that the majority of the world's orchids are tropical and grow as epiphytes among the bromeliads, ferns and mosses that cover the trunks and large limbs of giant rain forest trees, the situation is very different in more moderate Georgia. *Epidendrum conopseum* is the only epiphytic orchid in the continental United States outside Florida, and thus it is the most northerly orchid epiphyte in North America, reaching as far as North Carolina. Georgia's remaining orchids can occupy a rather wide



Small whorled pogonia

range of other habitats, as illustrated by the following examples.

Habenaria repens forms floating mats on quiet rivers, and many species of *Platanthera* (including *P. clavellata*, *P. flava* and *P. integrilabia*) are rooted in the mud of swamps. Our namesake *Tipularia* is a good example of a mesic orchid, favoring well-shaded locations that are neither wet nor dry. On the other hand, many species of *Spiranthes* seem to do well in the bright sun. *Spiranthes tuberosa* is often seen in the sun along roadsides, as are also *Platanthera ciliaris* and *P. cristata*. *Spiranthes cernua*, *S. praecox* and *S. vernalis* can be found in soil pockets in the bright sun of granite outcrops, while *S. magnicamporum* was recently discovered in open cedar glades. In acid soil under pines and oaks *Cypripedium acaule* seems to do well, while the orchid in cedar glades (very shallow soil over limestone) obviously prefers alkaline situation.

Photograph: Christina Bird

Nutrition

Except for the genera *Corallorrhiza* and *Hexalectris*, the orchids of Georgia all have green leaves for at least part of the year and thus make their own food from the sun's energy by photosynthesis. Most orchids in Georgia survive the winter in their underground rhizomes, and if any sign at all remains to show where they are hiding, it is only the dead flower stalk bearing empty capsules. The leaves of *Goodyera pubescens*, however, are evergreen and attractively marked all winter. *Tipularia* and *Aplectrum* are unusual in that their single leaf is present and functional from mid-autumn to early spring but has nearly disappeared before the flowers of *Aplectrum* appear in late spring or is completely gone by the mid-summer flowering of *Tipularia*.

As mentioned above, the coral-roots are not photosynthetic as they lack chlorophyll. They are instead saprophytic, depending on the decaying organic matter in the soil (humus) for their nourishment.

Very important in the nutrition of orchids is the help they receive in the absorbing of water and minerals from the soil. A mutually beneficial symbiotic relationship exists between the roots of many plants (including orchids) and certain fungi in the soil. The threads of the fungus greatly increase the surface area of the root and make much more efficient the absorption of water and minerals and the transport of these substances into



Showy orchid

the root. In return, the fungus depends on the orchid plant for its carbohydrates, because, lacking chlorophyll, it cannot make its own.

Orchid Transplantation and Conservation

Because orchids are usually very attractive plants and are often quite rare, many people are tempted to dig them up and transplant them into their gardens. This transplanting is nearly always a failure because of the missing fungal relationship. As so many of Georgia's orchids are scarce, they should remain where they are established so that they can continue successfully and be enjoyed by everyone.

Hard Botanizing

By Margaret Shannon

Andre Michaux's travels in Georgia began at a snail's pace, impeded by flood and mud, and ended in a tempestuous flourish of wind, water and sail. In between, he suffered illness and injury and the indignity of losing his horses to thieves. He took a decidedly jaundiced view of Georgia's towns and its people.

Most of all, however, he botanized, and he had surprisingly few complaints in that respect. He discovered several new species, puzzled over others and collected extensively. He once dug up 200 specimens of *Epigaea repens*, the trailing arbutus, in a single day.

Michaux was a French botanist who came to America under royal sponsorship in 1785 at the age of 39, easily shifted loyalty to the new regime after the French Revolution and returned home in 1796 after conducting the most extensive botanical exploration undertaken up to that time of the fledgling country, Florida, the Bahamas and part of Canada. He also served as a not-so-secret agent of the post-Revolutionary French government in a failed plot to

drive Spain out of the lower Mississippi River area with a mercenary army raised by George Rogers Clark.

A year after arriving in New York, Michaux had shifted his principal base of operations to Charleston, South Carolina, buying a 110-acre tract up the Ashley River in plantation country, building a house and starting a holding garden for the thousands of plants he would subsequently collect for shipment to France. His first expedition south from Charleston took place in the spring of 1787 in the company of his 16-year-old son, Francois-Andre, whose mother had died when he was born; a black slave bought at Charleston; and Scottish botanist John Fraser, who had insinuated himself into the group and whom Michaux soon came to consider both a botanical ignoramus and a pain in the neck.

Nobody expected easy going, but the difficulties might have made a less hardy traveler than Michaux turn back or at least take another route. The early signs were auspicious. When the party reached the Two

Sisters ferry on the Savannah River some miles above Augusta, Michaux "went across to the other side by boat and went down for about four miles to a place surrounded by hills and covered with trees," he wrote in his journal. He found a mountain laurel of unfamiliar hue and an azalea "which is dark red in all parts of its flower. Although its color is not very bright, the bush will be one of the most beautiful as an ornamental plant in the garden." It was *Rhododendron periclymenoides*.

Then came trouble. "We crossed by ferry at 2 p.m., and we found the roads were so bad that we were able to travel only two miles in five hours," Michaux reported. "The horses had to travel in mud up to their chests and at times in water. At one place where the bridge had collapsed the horses had to swim across."

When the group finally came to dry land the next day, April 26, 1787, the botanist made one of his most important discoveries—an azalea of "fire-red color," to use his words, the flame azalea, *Rhododendron calendulaceum*. Oddly, he shortly became distracted by more mundane matters. "After walking for miles," his journal says. "we came to a sort of miserable hamlet called here a town, consisting of only four or five houses. The place is named Ebenezer." He took one look and left. "We slept at a plantation occupied by a woman from Holland," he wrote. "She gave us supplies and let us visit the gardens, where I found a species of *Halesia* (the silverbell) called by some a *diptera*." Until then, he hadn't really believed there was such a species.

Michaux's first major stop in Georgia was Savannah, where he

arrived April 30. "The city of Savannah is composed of 150 houses situated near the river of that name on a bluff formed of sand piled up by the wind," he wrote. "The city is laid out symmetrically, but on account of the few houses this regularity is not apparent, and the inhabitants boast of this fact. The streets are very broad, and the soil, which is formed of shifting sand, increases the heat and the discomfort one feels in a climate that is always very hot."

There was more mud after leaving Savannah on May 2, but Michaux complained less, apparently delighted at seeing more *Magnolia grandiflora* that day than he had ever seen before. The next day, on May 3, when he reached the Ogeechee River ferry, he had his first sighting of the Ogeechee lime, *Nyssa ogeche*. Two years later, in 1789, he would meet William Bartram, who, with his father John, had first discovered the lime.

Michaux was averaging about 12 miles a day, except when hampered by bad weather. Exploring and collecting were slow business, as was travel in general. After noting on May 5 that he "picked an arum with a spotted stalk, but the inside as white as the flower of a lily," possibly *Peltandra sagittifolia* (*P. virginica* ssp. *luteospadix*), he arrived the next day at Sunbury, near Midway, to seek passage to St. Augustine. Sunbury, now a ghost town, was then a busy port.

Francois-Andre, the slave and Fraser went on to the Altamaha River area. "I remained at an inn six miles from Sunbury because of an injured leg, which has been getting worse for several days," Michaux wrote in his journal. "This was caused by the bite

of an insect that the woods are full of, and constant rubbing against the horse has produced an abscess and considerable inflammation." Was the "insect" a tick? He doesn't say. At any rate, it kept Michaux away from the area where John and William Bartram had discovered *Franklinia alatamaha* in 1765.

With passage to Florida unavailable, the group retraced its route north to Savannah and Augusta, and when Michaux's horses were stolen—a common fate in those days—he was able to insinuate Fraser out of the entourage. It was almost worth the price of the horses.

The French botanist's second trip into Georgia took place in late fall 1788 and was mainly for collecting. He reached Augusta on November 8, and a few days later collected 200 trailing arbutus plants. He was exultant about his foraging as he fanned out from Augusta for a total of 120 miles of exploring and digging. He reports finding "rare" and "remarkable" plants, most of which he does not list in his journal. He was kept busy boxing them, and on November 20 delivered 1,168 trees and plants to be shipped to Charleston via Savannah.

From Augusta, Michaux went inland as far as Washington, Georgia, but the journey produced little of



interest botanically—judging from his journal. It did produce an evening at the home of a Mr. Freeman, who was absent, and whose “young, very beautiful, but very pious wife” spent three-and-a-half hours discussing the differences among the Methodists, the Anabaptists and the Quakers. “I grew tired of it despite the artlessness and kindness of this woman,” he wrote, “and I went to bed.”

It was spring 1791 before Michaux returned to Georgia. On April 17, he embarked at Charleston and two days later debarked at Cumberland Island, where the relatively few long-term residents had been

supplemented by groups of mainland settlers who had fled for protection from Indians. Nevertheless, after botanizing for one day on Cumberland, Michaux headed for the mainland and St. Marys, then a rowdy port town. On April 23, Michaux left to explore the banks of the Satilla, the broad-mouthed river that pours into the Atlantic Ocean opposite the northern tip of Little Cumberland Island. The Satilla, tidal upriver beyond today’s Woodbury, follows a 260-mile zigzagging path toward—but not into—the Okefenokee Swamp.

Michaux’s record of this journey is a series of short entries almost devoid of botanical notes. He says that he botanized around one James Moore’s place on April 24, but says nothing about his sightings. The further he went, the closer he got to Indian

territory. On April 26, he lost his horses—possibly to Indians, though he does not speculate as to their fate.

The night of April 28, he “camped near the home of hunting Indians,” and the next day reached an Indian trading post, probably Burnt Fort. Michaux by then had covered only a modest part of the Satilla, but the lack of horses and the increasing presence of Indians made a return to the coast advisable. As April ended, he crossed land to the St. Marys River to go by boat to the town of St. Marys.

Fortunately, the Frenchman did make a botanical note on May 1. He found, he writes, “a new species of *Sarracenia*.” In all

likelihood it was *Sarracenia psittacina*, the parrot pitcher plant. Michaux returned to Cumberland on May 2, but he was back on the mainland for a whirlwind of collecting various plants, including “*Andromeda ferruginea* (*Lyonia ferruginea*), *Kalmia hirsuta*, and *Befaria*, etc., in abundance.” Shrubs were high on his collecting list, and a *Pieris*, a mountain laurel and a fly-catcher were excellent results as far as he was concerned.

Now he was ready to return to Charleston laden with plants that would go into his holding garden and sooner or later be sent to his royal patrons in France, some to end up in Marie Antoinette’s garden at the Little Trianon at Versailles.

As things turned out, Michaux almost didn’t make it to Charleston. “Unfavorable winds prevented the

Outdated nomenclature makes identification of Michaux’s sightings next to impossible.

captain's putting up sail," he wrote on May 5. He passed the time by botanizing and recorded two locations on Cumberland of the ubiquitous sandspur. His journal speaks succinctly of what happened in ensuing days.

May 6: "The ship sailed for Charleston. That evening, a storm came up. Thunder and lightning continued during the night. The wind shifted several times. We found ourselves in front of St. Augustine, Florida."

May 7: "After many difficulties and fatigue, we came back to Cumberland Island."

May 8: "Botanized and analyzed plants from this part of Georgia."

May 13: "Embarked again."

May 16: "Stormbound in the Savannah River because of opposite winds."

For the next three days Michaux botanized around Savannah, including an area "around the beacon light constructed at the seashore for safety." On May 21, the ship at last reached Charleston, only to become becalmed at the entrance of the harbor and unable to land. On May 22, passengers were finally able to debark. The normal two- or three-day trip from Cumberland had taken two weeks. The Frenchman had no more Georgia adventures; he brushed the border a time or two, but only incidentally.

In his journal, Michaux mentioned between 100 and 200 species in Georgia. There are more in his herbarium, now housed in Paris. For instance, on the sheet on which is mounted a specimen of the Cherokee rose, *Rosa laevigata*, he wrote that it was found near Savannah. A native

of China, the rose had already been naturalized in America. Still more are contained in the manual of species produced after his 1785–1796 venture, *Flora Boreali-Americanana*, which was published posthumously in 1803.

The now outdated and often incomplete or abbreviated botanical nomenclature used in Michaux's journal makes identification of all of his sightings next to impossible. Even so redoubtable a botanist as Charles Sprague Sargent, who transcribed (but did not translate) the journal in 1888, found the task intimidating; he identified what species he could in footnotes, but skipped many more.

The following list, a minuscule part of his sightings in Georgia, hints at the variety of species that caught his eye: leatherwood (*Dirca palustris*), fire-pink, river birch, a grass pink, rose pogonia, cabbage palmetto (*Sabal palmetto*), spiderwort, wild rice, water locust (*Gleditsia aquatica*), sweet shrub, a hawthorne (*Crataegus aestivalis*), swamp cottonwood (*Populus heterophylla*), a turtlehead (*Chelone glabra*), a vinca-like species that was possibly *Trachelospermum difforme*, ladies'-eardrops (*Brunnichia cirrhosa*), yellow ladies'-slipper, nodding trillium and a new (to him) buckeye (*Aesculus parviflora*).

The ship on which Michaux returned to Europe was wrecked off the coast of the Netherlands. Parts of his journal and many of his plant specimens vanished in the sea, and all the specimens that survived were water-soaked. He spent six weeks remounting them. Three years later he was sent on an expedition bound for Australia, but along with most of

the scientists he left it at the Ile de France, in the Indian Ocean, in protest against the irascible captain, Nicholas Baudin. Michaux botanized on the Ile de France for several

months and then transferred to Madagascar. There, stricken with "the fever of the country," possibly malaria, he died on November 13, 1802. He was 56.

May
Le douze, notre marche fut de six Miles, et ayant nous avons campé à vingt un Miles de Savannah et environ quatre Miles d'Ebenezer.
Une petite Rivière qui passe au cet endroit nous avons appelle au recolte du Halesia diptera dont j'avois toujours douté jusqu'à ce que je recueilli le Populus heterophylla.
Un arbuste à fl. opp. les fruits murs et tombés la plupart étoient la ressemblance d'acacia d'un rizier.
Un Mespilus? très grand arbrisseau fruit rouge sur la colline qui borde cette rivière de Zigania palustris.

Le Dimanche treize May nous avons fait quinze Miles et nous avons campé sur la chaîne de collines qui bordent la rivière de Savannah où a été un ferry appelé Two sisters (les deux sœurs). Je retrouva en cet endroit l'Andromeda arborea près à fleurir.
Le 14 notre marche fut de neuf Miles. Nous passâmes Chelone glabra, Gladitria aquatica chez le Capit. Prevott fils d'un ancien français. Il me mena dans une partie de bois qui abonde en Annona dont il faisait avec de la racine des cordages assez forts en la faisant rouir.

"May 12, 1787: We did six miles and camped 21 miles from Ebenezer. A little stream which passes this place at the foot of a field where we camped gave me a crop of Halesia diptera (a silverbell), which I have always doubted up to this time. I picked the Populus heterophylla (swamp cottonwood) in ripe fruit. Toward evening on a creek which flows near the house of a Dutch widow I saw several Halesia, a large bush, and in this creek a great deal of Zigania palustris (wild rice).

"May 13, 1787: We made 15 miles and camped on a chain of hills bordering the Savannah River opposite a ferry called the Two Sisters. Here I found the Andromeda arborea ready to flower.

"May 14, 1787: We made nine miles and came to the home of Captain Prevott, son of an old Frenchman. He took me into part of the woods which abound in Annona (pawpaw), the bark of which makes into strong rope by steeping it."

Lair of the Snorkelwort: Stone Mountain

By James R. Allison

Some 16 miles east of the State Capitol building is perhaps Georgia's greatest natural wonder, Stone Mountain. Said to be the world's largest exposed mass of granite, it rises some 686 feet above the surrounding plain, covers 563 acres and has been estimated to contain 7.5 billion cubic feet of rock.

The mountain and surrounding land was bought by the state in 1958 and became Georgia's Stone Mountain Park. Few of the park's millions of visitors are aware of its biological importance, but it is surely the Atlanta Metro Area's botanical Crown Jewel.

Like all granite outcrops, the mountain had its origin deep underground in molten rock that cooled, hardened and eventually became exposed through millions of years of erosion. The Stone Mountain Granite is estimated to have an age of 300 million years: perhaps 100 million years of cooling, 100 million years of erosion before the two miles



Profile view of Stone Mountain before 1902

Photograph: Geological Survey, Bulletin 9-A, 1902

of overlying rock and soil eroded away, and another 100 million years of erosion to produce the present landform. The rock is a type of granite known as monzonite, and is composed of about 28% quartz, 60% feldspar, 11% muscovite, and 1% biotite. The low proportion of biotite (black mica) gives the rock a lighter color than that of two other Metro Atlanta granitic mountains, Arabia Mountain and Panola Mountain. These differ from both Stone Mountain and from each other not only in the relative proportion of the four minerals just mentioned but in the rock structure (banding and other

flow structures) and texture (size of crystals of component minerals). Outcrops of Stone Mountain Granite occur over an area of about 10 square miles, evidence that the mountain was once far larger than it is today.

The earliest written account of the mountain is that of the Spanish explorer Juan Pardo, who visited what he called "Crystal Mountain" in 1567. Being in "Indian Territory," it remained little known for most of another 300 years. With the completion of the Georgia Railroad in 1845, the mountain began to become a tourist attraction. Unfortunately the railroad also made it practical to begin

quarrying the granite. By the latter 1800's production had risen to 20,000 rail-car loads per year. Signs of this activity can be seen today over much of the mountain's lower slopes.

The first recorded visit to Stone Mountain by a botanist was on July 20, 1846, when the Rev. Thomas Conrad Porter, a botanist and theologian, explored the mountain and collected a plant that would later be named for him: *Viguiera porteri*, the "yellow daisy" of the park's annual festival. Subsequent explorers discovered a number of other plants on the mountain that were new to science and only or usually found on rock outcrops: black-spored quillwort (*Isoetes melanospora*), Georgia oak (*Quercus georgiana*), Georgia rush (*Juncus georgianus*), granite aster (*Aster avitus*), granite coreopsis (*Coreopsis grandiflora var. saxicola*), granite panic-grass (*Panicum lithophilum*), hairy-stem

spiderwort (*Tradescantia hirsuticaulis*), rock blazing-star (*Liatris microcephala*), rock mountain-mint (*Pycnanthemum curvipes*), Small's purslane (*Portulaca smallii*) and spotted phacelia (*Phacelia maculata*). Despite literally millions of visitors over the years, every one of these can still be found somewhere on the mountain.

The summit has a low diversity of native plants due to its windswept condition, the sizeable area devoted to manmade structures and the landscaping with exotic cultivars. Most conspicuous among native plants are stunted loblolly pines

(*Pinus taeda*), red "cedars" (*Juniperus virginiana*), sparkleberry (*Vaccinium arboreum*), Carolina jessamine (*Gelsemium sempervirens*) and scattered yellow daisies. The upper portion of the mountain is dotted with shallow depressions that hold water during the winter and spring but are dried up much of the time in an average summer. Most of these vernal pools have been seriously disturbed by construction activities, litter and so forth and are nearly devoid of life. A very few of them, however, still contain remarkable natural communities that are restricted to this microhabitat, one that fluctuates between aquatic and desiccated and between frozen and blisteringly hot extremes over the course of a year. Here grow two plants that are protected by both the national Endangered Species Act and the Georgia Wildflower Preservation Act: the black-spored quillwort and the

Stone Mountain has its origins deep underground

snorkelwort (*Amphianthus pusillus*).

The quillwort is a perennial, grasslike fern-ally that is at most a few inches tall. It is known to persist at only eight sites, all in Georgia, the majority of which have only one or two small pools suitable for it. It grows submerged during the cooler months, when rainfall exceeds evaporation, but is quite happy exposed to the air, so long as the soil retains moisture. When the soil eventually becomes parched, its leaves wither and disintegrate, as though the plant had been killed by drought. As little as 24 hours after a summer thunderstorm restores aquatic conditions, however, the black-spored quillwort begins to produce new leaves! An alternative common name given for *Isoetes* is "Merlin's grass," quite appropriate for this amazing plant that seems to vanish and then reappear several times over the course of a summer, according to the timing of showers.

The other protected species in these pools is the snorkelwort, found on granite outcrops, mostly in Georgia and in a handful of sites in Alabama and South Carolina. This member of the foxglove family (*Scrophulariaceae*) is the only member of its genus, and thus it is considered an ancient species, with no close living relatives. Like the quillwort, it is only a couple of inches tall, but unlike its neighbor, the snorkelwort is an annual: when the pools dry up, it dies, persisting through the summer strictly as seeds. A few seeds sometimes germinate during the summer if rainfall is heavy, but most wait until the cooler weather of autumn to get started. From a short, submerged stem arises

a threadlike scape which bears at its tip a pair of tiny, opposite, leaflike bracts that float on the surface of the water like twinned miniature lily-pads. Between the bracts there develops a single tiny, white flower. Other flowers develop on the submerged stem; as long as they remain submerged they set seed without opening, but they will open if exposed to air. But even the open flowers that are borne between the floating bracts, up where they can "breathe," are probably self-pollinating. The anthers are positioned next to the stigma so that when they release their pollen it contacts the stigma without having to be brought there by an insect. Cross-pollination is surely a rare event, as I have never seen an insect probe a snorkelwort flower.

Due to the extreme annual oscillations of temperature and moisture, the black-spored quillwort and snorkelwort share the vernal pools with only a few other life forms visible to the naked eye. The vernal pools often have tufts of Georgia rush, a grasslike plant that is one of the most common species of Georgia's granite outcrops. A more conspicuous denizen of these pools, due to the bright red color of its stems and leaves, is diamorpha (*Diamorpha smallii*), a plant familiar to all who have visited a granite outcrop in late winter or spring. Although found in vernal pools, this low, succulent annual is most abundant in shallower depressions that do not retain as much water. Two remarkable animals, tiny crustaceans, have been found in vernal pools on top of the mountain: fairy shrimp and clam shrimp. Though only about 1/8 inch

long, they appear like miniature, translucent versions of their marine namesakes. They live during the cooler months when an aquatic environment is present and die when the depressions dry up. Their eggs rest in the soil along with snorkelwort seeds, awaiting the return of favorable environmental conditions, meanwhile withstanding soil temperatures that would be unbearable to a bare-footed biped.

On the lower slopes and on more level outcrops near the mountain, the visitor can see the typical flora of the "flatrocks" discussed in previous *Tipularia* articles (especially November, 1987). In spring, areas with a shallow soil cover are filled with masses of diamorpha. Slightly deeper soil is carpeted with a white blanket of another annual, rock sandwort (*Arenaria uniflora*). With greater soil depth, herbaceous perennials begin to dominate, beginning with three yellow-flowered species, sunnybells (*Schoenolirion croceum*), rock sundrops (*Oenothera fruticosa* var. *subglobosa*) and woolly ragwort (*Senecio tomentosus*). The last is a most attractive plant, one that deserves a more euphonious common name! With sufficient soil accumulation or where deep crevices in the granite provide the roots protection from desiccation, shrubs and trees are able to gain a foothold. Two of the most notable of these woody plants are Georgia oak and a splendid, large-flowered form of showy St. John's-wort (*Hypericum frondosum*).

In the hot, dry, summer, the number of species in flower on the mountain is, of course, reduced. When temperatures are high, the

shallow soils dry out quickly following rains, creating microhabitats of desert-like conditions. This is reflected in the presence of eastern representatives of genera better developed in the arid West, including prickly-pear cactus (*Opuntia humifusa*), bear "grass" (*Yucca filamentosa*) and rattlesnake master (*Manfreda virginica*), a relative of the famous century-plant. Two summer-flowering succulents are found in soil that is even shallower and drier: granite purslane (*Portulaca smallii*) and fameflower (*Talinum teretifolium*). Like many other members of the purslane family, their flowers open at a particular time of day, with those of the *Portulaca* opening at midday and those of the *Talinum* in late afternoon.

As the days begin to shorten, a second flush of flowering activity begins to sweep over the outcrops, highlighted by the yellow daisy, rock blazing-star, granite coreopsis, granite aster, and dayflower (*Commelina erecta*).

The flatrock endemics alone make Stone Mountain a botanical treasury, but the mountain holds a variety of other interesting habitats. These include boulders that have broken away from the mountain, with crevices and overhangs sheltering some ferns that are scarce in the Piedmont, such as woolly lipfern (*Cheilanthes tomentosa*), lobed spleenwort (*Asplenium pinnatifidum*) and (rarely) Bradley's spleenwort (*Asplenium bradleyi*). Two such plants are known only historically from the mountain: mountain spleenwort (*Asplenium montanum*) and purple cliffbrake (*Pellaea*

atropurpurea). These have either disappeared (collected out of existence?), been overlooked or persist somewhere on the part of the mountain that is off limits due to steepness.

The most botanically interesting of these other habitats is a remarkable forest that has developed on the northwestern flank of the mountain. The canopy consists of trees common in the area, but the understory and herb layer have unique compositions. Most notable are several rare shrubs: Rafinesque arrowwood (*Viburnum rafinesquianum*), granite gooseberry (*Ribes curvatum*) and prickly-ash (*Zanthoxylum americanum*). The herb layer boasts some rare and/or beautiful plants as well, including rock mountain-mint, sessile boneset (*Eupatorium sessilifolium*), glade windflower (*Anemone berlandieri*), smooth rockcress (*Arabis laevigata*), marginal woodfern (*Dryopteris marginalis*), trout lily (*Erythronium umbilicatum*) by the thousands and, in the rockier areas, state-protected Puck's orpine (*Sedum pusillum*). A curiosity found here in some abundance is an albino form of violet wood-sorrel (*Oxalis violacea*).

Since the mountain makes up less than one fifth of the 3200 acres of the park, it goes without saying that there are many botanically interesting places off the mountain proper. Space does not permit a discussion of these except for the single most remarkable one.



Aerial view of Stone Mountain pre-1925

Photograph: Geological Survey, Bulletin 42, 1925

At the base of the mountain, on its north side and east of the carving, is a pocket where conditions resemble those found in the mountains farther north in the state. Here a cove forest has developed, due to shading by the mountain for much of the day combined with elevated moisture levels from the tremendous runoff from the mountain's bare slopes. There are large areas where the forest floor is carpeted by ferns, and there is a great diversity of hardwood trees and shrubs. One can even find an occasional chestnut (*Castanea dentata*) sprout, a rare sight as far south as DeKalb County.

Despite a history that includes some abuse and neglect of its natural features over the last 150 years, despite the train rides, laser shows, skylifts and other manmade attractions, Stone Mountain has yet to be entirely tamed. Let us hope that it never is, for the sake of the dazzling array of life forms that call the mountain home and for the wonder they should inspire in untold generations to come.

First Person Singular: Rocky Days

By Christina Bird

It was another of those pre-determined days: I had my mind set on finding orchids regardless of weather conditions. My destination was the sandstone outcrops of Broxton Rocks in Coffee County. It was late August 1990, and the area's very hot summer had included good moderate rainfall, resulting in ideal conditions for the local flora.

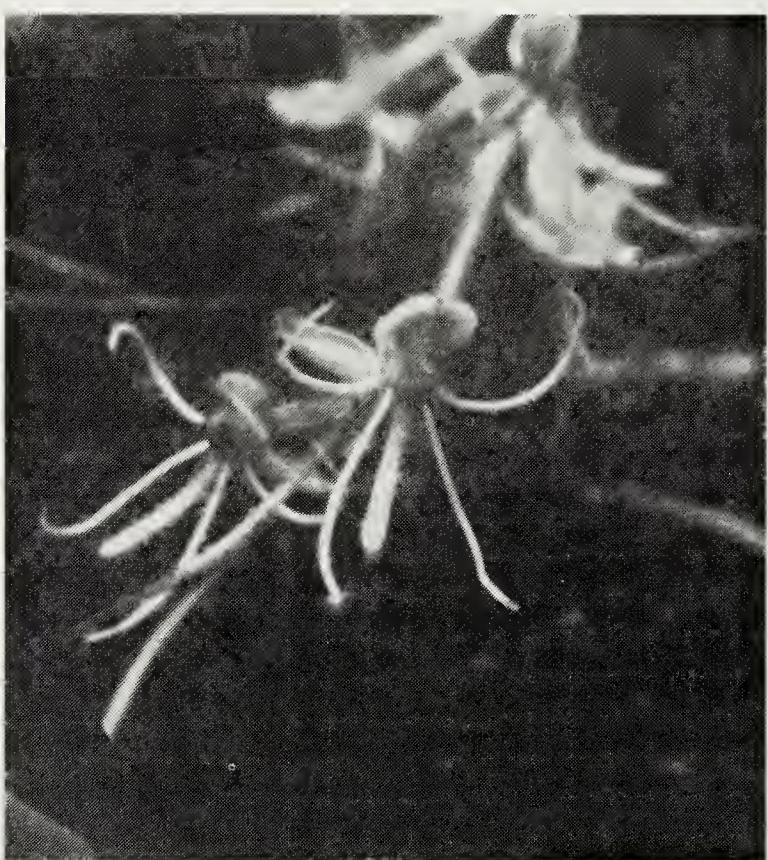
Rocky Creek's tannic-acid water was foaming as it passed over the boulder pool areas. In the gorges, the boulder walls still sported a few green-fly orchids (*Epidendrum conopseum*) in bloom, left from a prolific summer season. Atop one of the boulders, in the soil, I found my especially sought-after orchid, the greenish-white, spidery, long-horned *habenaria* (*H. quinqueseta*). But

something was wrong. While just past prime in flower, the plants were not standing erect as they should; rather, recent storms had flattened them, creating the appearance of a rambling, flowering vine covering the rock.

Still, as I observed the flowers I was very impressed. The individual flower faces gave the distinct impression of a monkey face-mask, much more so than the more northern monkey-face orchid (*Platanthera integrilabia*). So much for common names! In addition, the short divisions of the petals gave a punk-rock hair-do look, while the single, two-inch-long spurs added an element of grace to the total inflorescence. All in all a neat, fun plant!

Since then, it has been my desire to share this unusual plant with others; however, something has affected the plants during the budding stages the last two years, preventing flowering. In 1992 the weather was quite arid, while 1993 was overly wet, but both had the same sad results. I only hope The Nature Conservancy can solve the mystery and have the problem corrected.

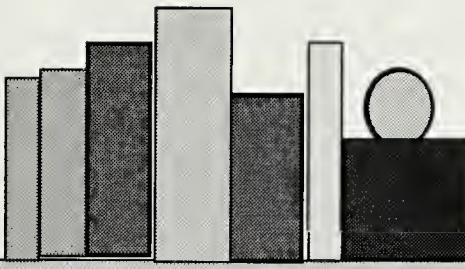
As I understand it, Broxton Rocks is one of only two locations for this plant in Georgia, with others in northern Florida. I hope the Georgia populations will survive, so that others can enjoy these flowers as much as I have.



Photograph: Chuck Wilson

Long-horned *habenaria*

Bookshelf



Flora of North America North of Mexico

Volume 1 Introduction

Volume 2 Pteridophytes and Gymnosperms

Edited by the Flora of North America Editorial Committee

Oxford University Press, New York, 1993

After a history of fits and starts, the *Flora of North America* is a reality. The first continental flora dates all the way back to 1814 with Frederick Pursh's *Flora Americae Septentrionalis*, but subsequent floras were all done on a regional basis until 1905, when Nathaniel Britton started *North American Flora* at the New York Botanical Garden. The next real effort at a continental flora did not begin until 1965, when a group of botanists got together and created the idea and prospect of a flora. Sponsorship was difficult to come by, and after several dropouts the project languished until 1982, when the Missouri Botanical Garden offered to be the administrative center if the project would be funded by all collaborators. Eleven years later a project many felt impossible has produced its first two volumes.

Volume 1 is a large collection of essays in five categories. The physical setting of North America is explored through climate,

physiography and soils. A look at the history of the flora from the Cretaceous to the present is given in a plausible fashion. Classifications of our current flora and phytogeography are impressive. The impact of humanity and its views on the flora are wide-ranging, from what exactly weeds have to do with our flora to economic botany and conservation. Taxonomy is presented with great clarity following the system of the late, Arthur Cronquist, whose memorial tribute concludes: "Dr. Cronquist was a giant among botanists, and he will cast a long shadow into the future."

Volume 2 treats all the pteridophytes (whisk-ferns, club-mosses, horsetails and ferns) and gymnosperms (cycads, ginkgoes, conifers and Mormon tea) found in North America north of Mexico. This includes all of Alaska, Greenland and the French islands of St. Pierre and Miquelon south of Newfoundland, as well as Canada and the lower United

States. This means from the tropical ferns of south Florida all the way to the Arctic circle! David Emory says it is now the best fern book there is.

The quality of these two volumes is apparent on first glance. Never designed to be field guides, they are folio size, allowing large line drawings and large point text on high quality paper. The editorial committee did a great job of including as much up-to-date information as is possible.

A number of editorial decisions had to be made regarding what to cover and how, with a notable choice being made to do no innovation. This means that no taxonomic treatments are found here that have not been published elsewhere. This does not mean that the reader will find no surprises, for published changes in treatments were considered right up to the galley proofs. The pteridophytes show how much the thinking has changed on classification, with many new species and even genera that are not included in regional floras.

When the taxonomy is in a state of flux or confusion, the text points it out almost as if the editors are making a challenge: Are you, the reader, willing to take this on? Areas for future doctoral dissertations are easily found in its pages. When lumping or splitting, reasons for such are usually given, a great example of how the scope of the project transcends anything we have to date.

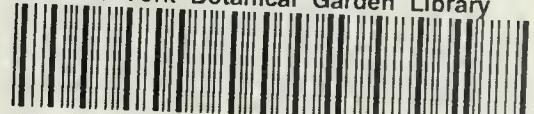
Each species entry includes complete authorship, fully spelled out, with the original publication cited, making it easy to find the first description and any changes in thinking. Common names are given,

but they seem to disdain the "made-up common names" (scientific names anglicized) many of us use, and prefer those in real common use. A map of North America with the range of each species shaded over the state and province lines is helpful to see how diverse the flora is, but don't put away your state atlas, as the maps are small. Key words in the description are in bold type.

To fully understand ferns, one needs to have a feeling for genetics and hybridizing. One reason David Emory likes the fern treatment here is that there are many charts that most regional floras simply do not include that show the putative origin or relationship of ferns. You'll need to pull out your botanical dictionary if you don't remember what "ploidy" and all of its prefixes mean. It is very complicated, but the charts are immensely helpful by presenting details in a graphical manner.

The books belong on the shelf of any serious plant lover, even though they are a pricey \$75 each. Since the remaining volumes will be coming out no faster than about one a year, this isn't too much to ask. When my books arrived, I was excited as a six-year-old at Christmas. You've got to behold their beauty and contents in person!

Reviewed by L. Scott Ranger



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Byliners

James R. Allison, botanist for Georgia Department of Natural Resources Heritage Inventory Program, and granite outcrop specialist, is also a valuable and regular reviewer for *Tipularia*.

Christina Bird is currently Field Trip Chairperson for the society and pursues a special interest in orchid photography.

David L. Emory is an amateur botanist who has found nine different orchids on his property in South Fulton County.

Sally Emory is currently Copy Editor of *Tipularia*. She spends the majority of her editorial time reviewing the work of others; this is her first original effort.

Bruce Horn is a mycologist with the U.S.

Department of Agriculture in Dawson, Georgia, where he studies fungi that produce toxins in peanuts. He is co-author with Richard Kay and Dean Abel of the recently published *A Guide to Kansas Mushrooms*.

L. Scott Ranger is editor of the Georgia Botanical Society newsletter, an avid amateur botanist and a regular contributor to *Tipularia*.

Margaret Shannon, journalist and founding editor of *Tipularia*, although retired, remains interested in many subjects including the travels of Andre Michaux.

Miriam Talmadge of Athens and Suches, Georgia, is the former editor of the Botanical Society newsletter, a writer and active field trip participant.

From the Editor, *continued from inside front cover*

those jobs were perceived easy to do and somehow came together under one roof, the editor's roof. Ginger, and later myself, in addition to editorial duties, became typesetter, layout artist *and* graphic production manager. It was not less time consuming, it was different and intriguing and captivated those of us with computers.

Ginger was compelled to resign just before sending her 1991 issue to press because of a new job and mounting work pressures. Ginger gave us our beautiful open layout generated on the Macintosh using Microsoft Word and PageMaker.

The magazine floundered for a brief period for lack of an editor when I arrived at the 1992 Wildflower Pilgrimage telling Michael Jones I owned a Macintosh, did print production projects and would love to "help" with *Tipularia*. Later that evening David Emory introduced me as the new editor. I had little idea what was in store.

I was fortunate to inherit Ginger's excellent layout. I built upon it, instigated the color covers and continued in her tradition to produce one issue a year.

At my encouragement, with some research in hand, the Bot Soc executive

committee voted to invest in a Macintosh computer, laser printer and modem in 1993. We divided up the editorial-production jobs and spread them out so that more people are involved. Sally Emory took on the job of copy editor with the 1993 issue, and the responsibility of being caretaker of the society's computer. We each have a modem and conveniently send material back and forth. We receive most manuscripts on disk.

Sustenance

Bot Soccer's whose names appear on every issue of *Tipularia* since 1986—one dozen issues—are: Anna Belle Close, Bill Close, David Emory, Sally Emory, Marie Mellinger and Tom Patrick. There are many other committed and frequent contributors from the membership, as well as an impressive list of other prestigious professionals. As chairperson of the Board of Editors, David Emory has insured *Tipularia*'s continuation. All, including the editors, have contributed as volunteers.

Gifts of volunteer time to *Tipularia* are enormous. They are gifts of the heart that bring an immense sense of accomplishment and pleasure in the doing.

—Sharon Worsham

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